

AMERICAN FORESTRY

THE MAGAZINE OF THE AMERICAN FORESTRY ASSOCIATION

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This is 1917—Not 1817

Only of comparatively late years have we of the lumber and timber industry begun to adopt modern methods. In all too many cases we have not yet begun.

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NO. 278

THE WHITE PINE BLISTER DISEASE

Congress asked to make an appropriation of \$300,000 to provide for its eradication or control—Experts present facts regarding the disease at the International Forestry Conference of the American Forestry Association—The resolutions adopted.

While the International Forestry Conference called by the American Forestry Association discussed ways and means of fighting the pine blister disease which threatens the five-leaved pines of the United States and Canada, in session, at Washington, D. C., January 18 and 19, 1917, Vice-President Marshall laid before the Senate an official communication asking for a supplemental appropriation of \$300,000 to eradicate or control the disease. This communication was from Secretary of the Treasury McAdoo and transmitted a letter from Secretary of Agriculture Houston asking for the appropriation. It was submitted to the Senate with the signature and approval of President Wilson, was referred to the Committee on Agriculture and Forestry and on February 3 the Senate adopted an amendment incorporating it in the Agriculture Appropriation Bill.

The series of articles which follow are from addresses delivered at the Forestry Conference.

WHAT THE WHITE PINE BLISTER DISEASE IS

By PERLEY SPAULDING, U. S. FOREST PATHOLOGIST

IF Luther Burbank, the well-known breeder and introducer of new plants, were to announce that he had for sale a perennial plant that in the spring produced seeds of rye, in the early summer seeds of wheat, and in midsummer seeds of barley, a sensation would be produced, which, if his announcement proved true, would surpass any yet known to American agriculture. The white pine blister rust parasite is exactly comparable to such a plant as this, however. Nor is it alone in this power to produce seeds of three distinct kinds. There are

thousands of lowly organized plants closely related to the white pine blister rust parasite which regularly produce three or more forms of seeds, or spores. The life histories of some of these chameleon-like plant parasites are most fascinating subjects for the amateur scientist could they but be presented by an Ernest Thompson Seton or a John Muir.

The white pine blister is a destructive, foreign parasitic disease of the white pines (pines with their needles in bundles of five each). It came to us from Europe in

RESOLUTION

Passed at the International Forestry Conference of the American Forestry Association
January 18-19, 1917

Whereas

The Pine Blister Disease threatens to greatly injure the white pine forests of Eastern North America, and is a growing danger to the white pine timber of the West, and its origin, propagation and transmission being now generally understood.

Resolved

That it is the sense of this Conference that active measures should be taken by the duly constituted authorities and by all good citizens along the lines advocated by the officials competent to recommend practical measures for preventing the further dissemination and, as far as possible, for the elimination of the disease.

Resolved

That immediate action should be taken by the Federal governments of the United States and Canada for adequate quarantine measures to prevent the spread of the disease to sections of the Continent not now known to be infected.

Resolved

That co-operation by the Federal governments with States and Provinces to eradicate or control the disease in sections now infected should be continued and extended by liberal appropriations.

Resolved

That the States and Provinces, both independently and by interstate, National and international co-operation, are urged to conduct complete investigations, provide proper quarantines and take all necessary measures, in keeping with the seriousness of the situation, to eradicate or control the pine blister disease.

Resolved

That a copy of this resolution be transmitted to the Secretary of Agriculture, to the chairmen and members of the United States House and Senate Committees on Agriculture and Forestry, to all members of the United States Senate and to the Governments of the Dominion of Canada and of the Canadian provinces.

diseased nursery stock of white pines **and in no other way.** The parasite is a low form of plant similar to, and closely related to, the wheat rust and cedar apple rust parasites. The former has two phases of development; one upon leaves of the barberry and the other upon the wheat plant. The latter also has two phases of growth; one upon the leaves of cedar and the other upon the leaves

berries. The parasite lives in the bark of an infected pine and after it once appears, produces a crop of spores each spring as long as that pine lives. If there are no currants or gooseberries near enough to the diseased pine for the spores to be blown from the pine to the currants and gooseberries the disease cannot spread any farther, because the "pine" spores cannot attack pines.



Photograph by J. Franklin Collins.

THESE TREES ARE INFECTED

Practically all these pines on Gerrish's Island on an arm of Portsmouth Harbor, Maine, are generally infected with the pine blister disease.



Photograph by J. Franklin Collins.

AN INFECTED PLOT OF PINES

Eighty per cent of the native white pine on this random quarter-acre plot near Kittery Point, Maine, were, in November, 1916, infected by the pine blister disease.

and fruit of the apple tree. In the same way the white pine blister rust has two phases of growth on two distinct hosts; one phase on the young bark of white pines, and the other phase on leaves of wild and cultivated currants and gooseberries. Three distinct kinds of spores are produced in a season.

In the spring spores are formed on the diseased white pine bark; they are blown about by the wind and infect the leaves of neighboring currants or gooseberries, but they cannot attack pines. They are rather short lived.

In early summer the second spore form ripens on the lower surface of infected currant or gooseberry leaves. These can attack currant or gooseberry leaves but cannot attack pines. The third spore form ripens also on the lower surface of the currant and gooseberry leaves. These spores are able to attack pines but not currants or goose-

FEDERAL ACTION REQUIRED IN FIGHTING THE PINE BLISTER DISEASE

1. A federal quarantine prohibiting shipment of all five-leaved pines and all currant and gooseberry bushes beyond the western boundaries of Minnesota, Iowa, Missouri, Arkansas, and Louisiana, to prevent the introduction of the pine blister disease from the eastern white-pine area into the western white-pine forests of the Rocky Mountain and Pacific Coast States.

2. A federal quarantine regulation prohibiting the shipment of all five-leaved pines and all currants and gooseberry bushes from infected areas into regions where the disease has not yet been found. This action could be taken at once and would save the public great prospective loss. At the present time, all pine, currant and gooseberry planting stock, from nurseries or the native woods, must be suspected of being infected. The direct loss through death of diseased pine stock, though considerable, is insignificant when compared to the cost of controlling the disease, or, if not controlled, the early loss of native and planted pines which might otherwise thrive for years.

3. Scouting should be continued on an extensive scale, to determine definitely the boundaries of infected areas, and to locate possible infections in new territory.

4. Large-scale experiments should be undertaken to determine the feasibility of controlling the pine blister disease, and the least expensive means of accomplishing this result most effectively.

The distance that the "pine" spores may be blown is unknown. The greatest distance definitely known is about 400 feet. The spores produced on currants or gooseberries are known to blow one-half mile or over and infect other currants. How much farther they may go no one knows. From currants infection has been traced to pines by McCubbin, of Canada, up to an extreme distance of 100 yards.

This gives us an immense advantage when we attempt to eradicate it from a given locality, the mere separation of the two hosts being sufficient to stop further spread of the disease. But this involves the sacrifice of one host in any given locality. In some places the removal of all white pines involves less loss than does the removal of all currants and gooseberries; while in other places the reverse is true. In either procedure a few hoggish people

are encountered who, rather than sacrifice a few dollars, or in some cases less than a dollar, will object to removal of their bush or tree and thus endanger hundreds and even thousands of dollars' worth of trees or bushes in their locality, besides giving the disease a chance to become so

to the white man, relatively mild disease. In the same way the smallpox destroyed entire tribes.

The same thing that happened to the Indians from newly introduced diseases is already happening to one of our broad-leaved trees. The American chestnut, lacking



Photograph by J. Franklin Collins.

TWO MORE VICTIMS

Both these native white pines in Maine have been killed by the pine blister disease and all the trees in the background are infected.



Photograph by S. B. Detwiler.

175 INFECTIONS ON THIS PINE

This tree at Ipswich, Massachusetts, was imported from France in 1902. It was removed from the plantation in 1916 at which time there were 175 pine blister disease infections on it. Some of them are shown, being marked by white tags.

well established that it never can be eradicated. The Federal Government has put a stop to our receiving any more young diseased white pines from abroad. It remains for us to get rid of what we have. Either the white pines or the currants and gooseberries must go in many localities if this disease is to be stopped in its spread.

It is a well proven fact, known to all students of parasitic diseases, either of plants or animals, that constant association for many centuries with a parasitic disease develops some degree of resistance in the host plant or animal. This results from the total destruction of those individuals which fail to develop resistance, thus leaving a residue of partially resistant ones. In the early days of exploration of North America the measles was introduced among the North American Indians from the Old World. The Indians, who had not the slightest degree of resistance to the new disease, were destroyed in thousands, by this,

the ability to resist a new chestnut parasite imported from China, is now well on the road to extermination.

In those places (in this country) where this European pine rust has worked longest undisturbed, it is doing with our non-resistant white pine just what the paleface disease did to the Indians and the foreign chestnut disease is now doing to our chestnuts. It has shown itself positively capable of destroying our white pine. The eastern white pine is not the only American white pine that is threatened by this insidious danger. There are seven other pines of the Rocky Mountain and Pacific Coast regions that will surely be attacked if this disease is not fought to a standstill where it now is. All of these are new to the disease and are likely to go the way of the Indian with the smallpox and the chestnut with the bark disease, if the white pine blister disease once reaches them.

WHAT SHALL WE DO ABOUT THE PINE BLISTER DISEASE?

By S. B. DETWILER, U. S. FOREST INSPECTOR

DEVELOPMENTS in the pine blister disease situation during the past year have crystallized sentiment among those interested in forestry and familiar with the facts into desire for immediate and concerted action. A few conservatives have taken the attitude that it is useless to attempt the control of any forest tree disease in this country because it has never been done. The general opinion among foresters and plant pathologists is that the white pine is too valuable to lose and that vigorous efforts should be made to fight the

pine blister, since there is no longer room to doubt the ability of this disease to completely kill all white pines growing in proximity to currant and gooseberry bushes. Although it is not proved by practical experience on a large scale that the disease can be completely controlled by the destruction of diseased pines and the elimination of all currant and gooseberry plants within areas of general disease, this plan has proved to be effective in checking the spread of the fungus from infected plantations.



TREE AT SWANSEA, MASSACHUSETTS

This white pine tree in native growth is about 30 feet high and shows the main stem girdled near the top. S. B. Detwiler, U. S. Forest Inspector, is making the examination.



THIS WAS DESTROYED

A fine white pine of native growth near Ipswich, Massachusetts, which showed so many pine blister cankers on the branches that it was marked for destruction before the spores which would have developed this year and spread the disease appeared.

It is certain that the blister disease cannot pass from pine to pine without passing through the intermediate stage on currant or gooseberry leaves. Therefore, the only question that can arise concerning the effectiveness of the proposed method of controlling the disease is whether it is possible to destroy all the currants and gooseberries on a given area and thereafter keep it free, and whether the value of the pine will justify the cost of the work. Further experience in eradicating currant and gooseberry bushes on a large scale will undoubtedly develop cheaper and more effective methods, as for instance, killing strongly-rooted bushes or mats of skunk currants by means of chemicals sprayed on the leaves. The destruction of the diseased pines is an additional

COÖPERATION BY CITIZENS REQUIRED IN FIGHTING THE PINE BLISTER DISEASE

Federal and State action, to be successful, requires the active coöperation of individual citizens in the following particulars:

1. When the disease is found on pines, currants or gooseberries, the State officials in charge of control work should be notified, and the diseased plants destroyed promptly, according to the recommendations of the authorities.
2. Where State authorities deem it necessary to destroy all currant and gooseberry bushes, or take other drastic action to control the disease, individuals should give all possible aid and influence others to do so.
3. The general planting of five-leaved pines should not be encouraged. The growing of currant or gooseberry stock should not be favored in localities where they may endanger white pines. In the case of white pine planting stock, the nursery from which it is purchased should be required to give a written guarantee that the stock was grown from seed in their own nurseries, that no infections of the white-pine blister disease have ever been found in the nursery or within 500 yards, and that the trees have not stood near currant or gooseberry bushes.

precautionary measure that appears advisable in large control areas to prevent the disease being carried to currants and gooseberries beyond the borders of the area.

When small spots of infection exist beyond the region of generally scattered disease, it will usually be advisable to destroy both pine and currant hosts known or suspected as having been exposed to infection, and the greatest sanitary precautions taken, such as sterilizing the uniform of inspectors, and disinfecting the plants having fruiting bodies of the fungus before they are handled, during such time as the spores are visible.

At the present time, the legal and financial barriers standing in the way of controlling the disease appear even greater than the practical difficulties. It will con-

some time to secure the required laws and appropriations, and meanwhile the disease will continue to advance rapidly into new territory. Time lost in efficiently applying control measures during the coming season will be dearly paid for if any future control is to be attempted.

It is plain that the greatest immediate need is widespread publication of the facts of the blister rust invasion, and rousing the general public to a realization of the dire results which this disease will cause if not controlled.

The blister canker fungus does not respect state or national boundary lines in its rapid spread. Effective control requires general action—state, interstate, national

and international. Nothing can be accomplished without adequate appropriations, and before the money can be wisely spent, most states need laws giving the authorities full power to apply the necessary steps in control. Publicity will secure the necessary power to act and act quickly; concerted action by state and national authorities is the only possible salvation for the pines. Nature has not intervened in checking the chestnut blight and other imported diseases, and it seems probable that we shall have to pay with the white pine, or a partial cash equivalent, for our open-door policy in importing plant pests.

SHALL WE PLANT WHITE PINE?

By C. R. PETTIS, SUPERINTENDENT STATE FORESTS, STATE OF NEW YORK

AS an economic necessity and in the application of true conservation and practical forestry, the wisdom of reforestation cannot be questioned. There are millions of acres of our soil whose productive use can best be and, to a large extent, can only be realized by using them to grow wood crops. This vast territory stands to-day idle. To become productive, it must first be reforested. In order to derive the full measure of use a tree adapted to grow under the prevailing condition must be selected. White pine has no equal in meeting and measuring up to the specifications of a tree that can be most profitably employed in reforestation generally in the northeastern United States. We cannot make many mistakes when we use white pine as an agent for employing the resources of nature in obtaining the productive capacity of these non-agricultural lands.

In the market, white pine is in great demand and on account of its qualities has a wider range of uses than any other wood we can grow. It is our most commonly used tree. Go into nearly any line and study its great variety



BRANCHES AND TWIGS DISEASED

In this tree at Ipswich, Massachusetts, there is to be plainly seen a large amount of pine blister disease on the branches and twigs.

of uses. It measures up to our demands for a wood for general purposes.

White pine is to forestry in the northeastern states what wheat is to agriculture; what iron is to manufacturing or what coal is to transportation.

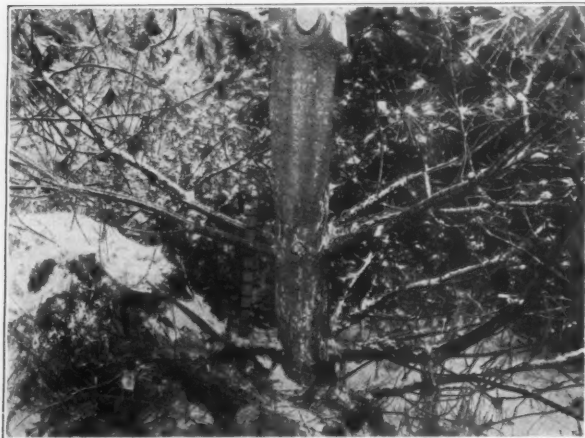
I have tried to state briefly why we must reforest and what an important factor white pine is in the future planting operations. We must have white pine for planting.

In answer to the question "shall we plant white pine?" I most emphatically say, yes. We must have white pine. We will obtain our chief future supply from plantations.

We to-day face a problem. We do not know all about the distribution of the blister disease, and as reforestation deals in future, we should defer further white pine planting until we know where it is safe and sane to plant. We must first make the unsafe places safe and expend every energy toward the control of this disease. We must plant but should defer it for a while.

We are gathered here to repent for haste. Our various forestry departments, associations, land owners and others about 1908 became enthusiastic about planting. The

necessary trees could not be obtained in this country at a reasonable price and, as a result, large quantities were imported and scattered in a thousand places. Unfor-



Photograph by S. B. Detwiler.

GIRDLED BY BLISTER DISEASE

A native white pine at Kittery Point, Maine, with the base and lower side branches girdled by the blister rust. The quarter-acre plot in which this tree stood showed 88 per cent of trees infected in November, 1916. Twenty-six per cent of the trees were dead.

tunately, some of these trees were diseased and we now must decide what we are going to do about what President Pack so well calls "A Bandit from Abroad."

Let us take a lesson from some of these many unfortunate circumstances. Why not meet the situation frankly? We must stop the spread of this disease. It can only be accomplished through eradication and control measures. We cannot fairly ask the farmer to give up all his currants and gooseberries that the forester may utilize his soil for growing pine. We must both of us make sacrifices. In places, pines will have to be removed as part of the control plan. We cannot now say where the immune strips are to be placed. The extension of white pine planting, under present conditions, may further the spread of the disease as well as make the control measure more difficult. The problem is difficult enough as it to-day exists.

A few years more of idleness of these soils is nothing in comparison to the future safety of white pine. We have not gained but rather lost through past haste. Wait until we first fully know where "we are at."

A study to ascertain the extent of the disease, location of different kinds of soil, also distribution of pine, currants and gooseberries, will add so materially to our knowledge that future plans can then be formulated.

For the time being, we should expend our energies in field investigations, control work and education of the public.

The general progress of reforestation need not be seriously interfered with because we may direct our energies to planting lands not best adapted to white pine with suitable species.

THE PINE BLISTER DISEASE PROBLEM AS A WHOLE

DR. HAVEN METCALF, IN CHARGE OFFICE OF FOREST PATHOLOGY, U. S. DEPT. OF AGRICULTURE

THE white pine blister disease has invaded America and dug itself in. The earliest importation of white pine nursery stock that we have been able to trace

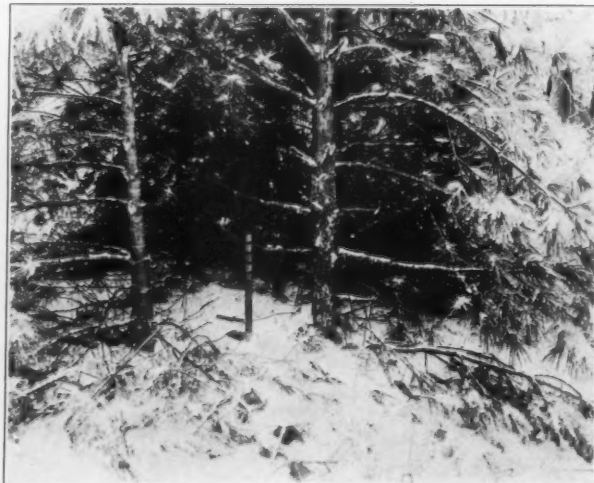
dates back only to 1899, but in this time the disease has become generally prevalent upon gooseberries and currants in New England, and at many points has established



Photograph by J. Franklin Collins.

IN A BADLY INFECTED AREA

This tree, photographed with a white cloth behind it to show the infection, had its main stem and many branches girdled by the pine blister disease. It is in a four-acre plot in Maine. In November, 1916, 87 per cent of the trees on the plot were infected and 16 per cent were dead.



Photograph by J. Franklin Collins.

WHERE SPORES WERE PRODUCED

Native white pine at Kittery Point, Maine, showing the main stem and many side branches infected. The rough bark on the main stem and at the bases of some side branches show that the disease has produced spores during the past season.

itself upon pine trees growing under as nearly normal conditions as can still be found in New England. West of the Hudson River the disease occurs at many points, but cannot be considered established, unless possibly in the Minnesota-Wisconsin area. West of the Mississippi River the disease is not known to occur, and it is wholly improbable that it can ever spread across the treeless plains to

the forests of western white pine and sugar pine by any natural means. It can, however, get there easily and quickly on diseased nursery stock and indeed may have gotten there already without our knowledge.

It is obvious that the control of this disease presents three very different problems:

(1) The problem for the western states, which is, so far as we know, entirely that of keeping out the disease. We must make sure that the disease does not already occur west of the Mississippi, and then make sure that by some means all movement into this area of nursery stock of five-needled pines, currants and gooseberries is stopped. Except in Oregon, Idaho and Montana, where local quarantines have been imposed, no effective restriction exists at the present time on the movement of five-leaved pines, currants and gooseberries from any eastern locality to any western point. It would obviously be foolish to spend much money in determining where this disease occurs, or in eradicating it where found, as long as nurseries are still free to distribute the disease as fast as it can be located.

(2) Between the Mississippi and the Hudson Rivers we have conditions similar to those obtaining in the coun-



Photograph by S. B. Detwiler.

CURRENT AND PINE

Here are seen infected flowering currant bushes in the corner of a yard at Kittery Point, Maine, with native white pine in the background and a large percentage of the pine already show the pine blister disease infection.

try at large seven years ago, that is, scattering infections of the disease, that can still be eradicated. In undertaking this problem we must profit by the experience of the past seven years. Up to this year the problem has nowhere been very vigorously attacked. State laws are mostly inadequate. In many states no eradication outside of a nursery is possible except with the consent of the

owner. In other states the state authorities have no power to destroy diseased currants and gooseberries, because the disease does not seriously damage these plants, and in few if any states is there authority for destroying healthy currants and gooseberries which are so located as to spread the disease. Nowhere has the Federal Government any power to destroy diseased plants of any kind. Up to a year ago there have been no specific appropriations for fighting this disease, and what has been done on this disease has been done as a side issue, and at the expense of other lines of work. If, then, the disease is to be eradicated over this wide central territory it will mean a sharp revision of law in most states, education of public sentiment to the point where the interests of one citizen cannot prevail against the interests of an entire community, or the interests of one community or one line of business prevail against the interests of an entire state. We must look forward to a long fight, for a disease with a long dormant period, and as strongly entrenched as this one, will not be overcome in three or four years. And finally, all action must be prompt. The time to combat any plant disease is while there is still but little of it.

STATE ACTION REQUIRED IN FIGHTING THE PINE BLISTER DISEASE

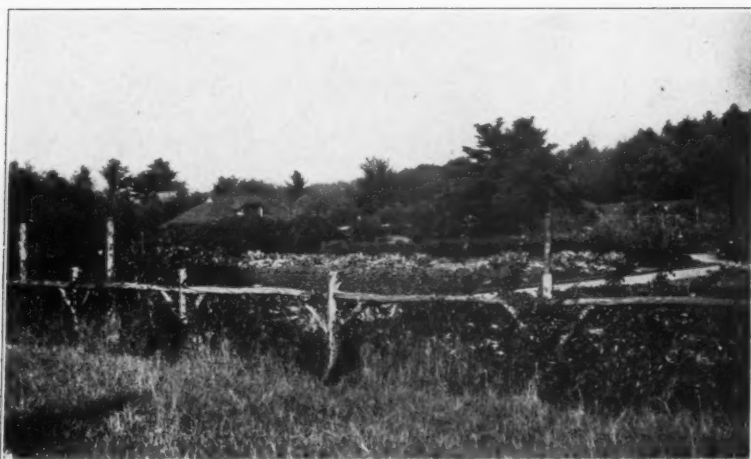
The various states in the white-pine belt should proceed against the disease, as follows:

1. Adequate laws should be enacted, giving authority to the proper state official to destroy all white pine, currant, and gooseberry plants infected with the disease or in danger of becoming infected. Because of the need for persons handling diseased plants to take the greatest precautionary measures to avoid distributing the spores of the disease from one place to another, eradication of the diseased plants should be done by men in state employ, specially trained and wearing a uniform that can be disinfected before approaching the vicinity of pines or areas of disease-free currants.

2. Each state should establish a quarantine preventing the introduction of any five-leaved pines, or any currant or gooseberry bushes from any area in which infection is known to exist, duplicating the action taken by the States of Wisconsin and Oregon.

3. Each State in which white pine is important as a native or planted tree should appropriate sufficient funds to enable the proper State official to conduct such operations as may be necessary for detailed scouting and the control of the disease when found.

4. Cultivated black currants should be declared a pest, and the bushes destroyed in all States where five-leaved pines grow, regardless of whether the disease has appeared in the locality. This action is advisable because the cultivated black currant is especially susceptible to infection, and the elimination of this plant would do much to prevent the rapid spread of the fungus.

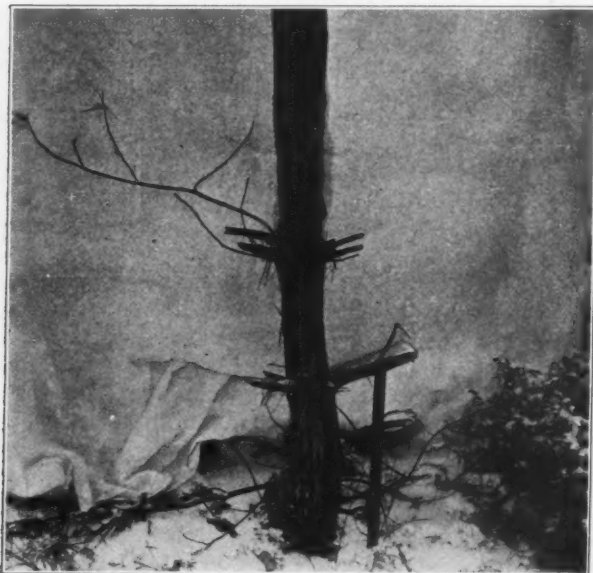


Photograph by S. B. Detweiler.

FROM GARDEN TO WOODLAND

A garden of an estate at Ipswich, Massachusetts, in which infected currant bushes are growing. The white pine in the background were planted in 1903 and in the spring of 1916 all of them showed infection.

(3) East of the Hudson River the problem is much more serious, and here the disease is unlikely ever to be eradicated. Here the effect of the disease is essentially to make the pine tree a cultivated plant, dependent for its existence upon the destruction of currants and gooseberries. It will have to be determined for communities or for larger areas whether the people prefer to grow white pine trees or currant and gooseberry bushes, for the two are now incompatible. The probable solution of this problem is that certain areas will be found in New England where the currant and gooseberry can be eradicated and the white pine grown. And there will doubtless be other localities where the eradication of currants and gooseberries is commercially impracticable and where the growing of white pine will have to be given up.



Photograph by J. Franklin Collins.

DISEASE PLAINLY INDICATED

Eighty-one per cent of the trees surrounding this on a quarter-acre plot in Maine are infected with the pine blister disease and of these 12 per cent were dead in November, 1916.

The entire problem is, however, but one phase of a larger problem, which may be stated as follows: Does free trade in plant diseases and insect pests pay? Is it an economically sound national policy? Is the entire importing nursery business worth as much to the country as the damage which it causes? Let us not deceive ourselves. Not a single plant disease or insect pest that has once become established in this country has been eradicated or is ever likely to be. No matter how well controlled, it remains in every case a permanent tax against the economic resources of the nation. If we succeed in controlling the white pine blister rust we may be sure that other diseases and pests will be introduced, which will be just as serious, for we know definitely that the undesirable plant immigrants are not all here yet. It is as important to safeguard the country against further invasions of this kind as to control this or any other disease or pest that has already been carelessly permitted to establish itself.

THE SITUATION TODAY

The United States Senate has added \$300,000 to the Agricultural Appropriation Bill for the eradication or control of the White Pine Blister Disease.

\$150,000 of this amount will not be available until states in the pine belt provide state appropriations—then it will be used in state cooperative work.

The United States Senate has also amended the Plant Quarantine Act to permit the Secretary of Agriculture to quarantine any State, Territory or District of the United States, or any section thereof, to prevent the spread of the disease.

Massachusetts asks a \$60,000 state appropriation to fight it.

New York requires \$30,000.

Minnesota desires \$25,000.

Maine asks for \$20,000.

New Hampshire asks for \$28,000.

Vermont wants \$2,000.

Connecticut requests \$15,000.

Rhode Island wishes \$5,000.

Wisconsin needs \$25,000.

Pennsylvania demands \$10,000.

Canada expects \$50,000.

LOSSES CAUSED BY IMPORTED TREE AND PLANT PESTS

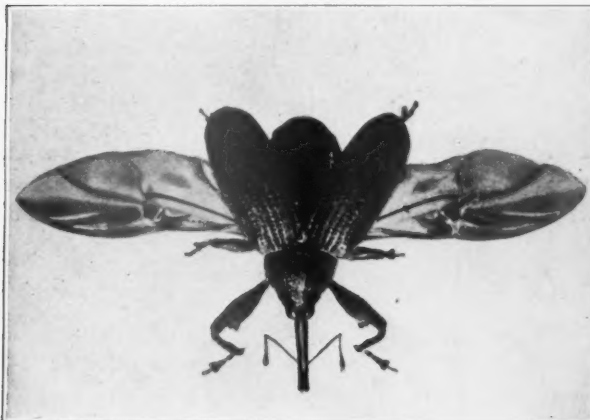
By C. L. MARLATT, CHAIRMAN, FEDERAL HORTICULTURAL BOARD

In view of the fact that fully fifty per cent of the tree and plant pests which in the past and at the present time are doing millions of dollars' damage every year to the agricultural and forest crops of the United States are imported, the American Forestry Association at its International Forestry Conference at Washington, D. C., January 18-19, 1917, heard addresses and discussions on the advisability of a national quarantine preventing the importation of tree and plant stock from other continents, unless such stock has the approval of the United States Department of Agriculture. The following is one of the addresses.—EDITOR.

THE virgin lands of the new world had originally an enormous advantage over the long-settled areas of the old world in their freedom from the host of plant enemies, insects and disease, which had developed through centuries of cultivation of special crops, and, if proper safeguards had been instituted, this advantage could have been largely preserved. Unfortunately, none of the countries of the new world, until very recently, took any precautions to prevent the introduction of these old-world plant enemies.

Confining our attention to the United States particularly, as a result of this neglect, probably more than

actively recently introduced pest, getting first foothold in Utah, from whence it has extended its devastations over much of the great alfalfa-producing areas of the adjoining states. Among the fruit insects are such well-known enemies as the codling moth, now entailing a cost for the treatment of trees and loss from injury to fruit taken together of approximately \$16,000,000 a year; and the San José scale, introduced with ornamental plants from North China, occasioning a loss in product and cost of treatment of at least \$10,000,000 a year. Among forestry insects are such notable enemies of forest trees as the larch sawfly, which threatens to complete the destruction



COTTON BOLL WEEVIL (*ANTHONOMUS GRANDIS*)

The cost to this country of the cotton boll weevil amounts to about twenty-five million dollars a year. It is gradually spreading throughout the cotton belt, and in 1916 reached northward to the South Carolina line. The picture, enlarged, shows an adult boll weevil.



BOLL WEEVIL LARVÆ

The manner in which the larvæ of the boll weevil injures the cotton boll is indicated by this photograph. The ravages of this insect cost this country annually 25 cents apiece for every man, woman and child.

fifty per cent of the insects and diseases now destructive to our agriculture and forestry are introductions, most of them unnecessary.

Typical examples of these introduced pests, in relation to general agriculture, are the Hessian Fly, introduced from Europe in revolutionary times and now occasioning an average annual loss to the wheat crop of approximately \$50,000,000, and in some years this loss has exceeded one hundred millions; the alfalfa weevil, a compar-

RESOLUTION

Passed by the International Forestry Conference of the American Forestry Association, January 18-19, 1917

In view of the spread of diseases and insect pests introduced from foreign countries, such as the chestnut blight, gypsy moth and white pine blister.

Resolved

That the American Forestry Association favor the principle of absolute national quarantine on plants, trees and nursery stock, to take effect at the earliest date which may be found economically expedient.

already largely accomplished of the larch timber of the United States and Canada, and the gypsy and brown-tail moths, which have long ravaged the forests of New England and have been the occasion of the spending of many millions of dollars in control efforts and of losses proportionately vastly greater. For mere control alone, the Federal Government has carried an appropriation for many years now of over \$300,000 a year to aid the States in the work

against these insects. Other notable forest and shade tree pests are the spruce twig moth, comparatively recently introduced, the leopard moth, and the elm beetle.

These are merely examples of a vast horde of introduced insect pests. Upwards of a hundred distinctly important injurious insects to agriculture and forestry have been thus introduced, and, in addition to these, hundreds of other minor insect pests. The total loss occasioned by these introduced insect pests to our national forests and farm crops, etc., probably exceeds \$500,000,000 annually.

Losses correspondingly large are chargeable to introduced plant diseases. Familiar examples of such introduced diseases are, the chestnut blight, which has already destroyed the chestnut forests over much of the eastern United States and threatens the existence of the entire native chestnut growth of the country; the white pine blister, a disease already widespread in the eastern white pine area and which ultimately will cause enormous loss to all white pine forests, and which losses will be vastly increased should it spread to the great white and five-leaved pine forests of the Rocky Mountain and Pacific Coast States. Introduced diseases affecting cultivated plants include such important examples as the common scab of the potato, of almost universal occurrence in this country and occasioning tremendous shrinkage in the value of this important crop; the wheat rust, which in

bad years may practically wipe out the entire wheat crop of large sections, as was the case last year in Red River Valley; and a corn mildew recently introduced and already accomplishing very serious losses in the South. Among diseases affecting fruits and fruit trees, the most notable example is the citrus canker, a disease recently introduced from Japan or Asia, and threatening the very existence of much of the enor-



THE BROWN-TAIL MOTH (*EUPROCTIS CHRYSORRHÆA*)

The brown-tail moth was imported by a Boston florist about 26 years ago on roses from Holland and France. It is a serious enemy to the orchard, forest, and shade trees, and ornamental shrubbery, and has long been recognized as one of the worst orchard pests of Europe. The hairs on the caterpillars produce the brown-tail rash, often causing considerable annoyance to the residents of infested districts.



STOPPING THE CODLING MOTH

An apple tree banded in order to collect the larvæ of the codling moth so that it may be destroyed.



THE CODLING MOTH (*LASPEYRESIA POMONELLA*)

The codling moth, or apple worm, occasions a loss, in cost of spraying trees and injury to the fruit, of sixteen million dollars a year in the United States.

mous citrus development of Florida and the Gulf Coast, a disease which Congress has joined with the States in an active effort to exterminate with the aid of a large appropriation. In addition to these more important diseases, many minor plant diseases have also been introduced.

While, therefore, much of the original advantage which the western hemisphere enjoyed from freedom from plant pests has been lost, there are still vast numbers of foreign insect pests and plant diseases with large capacity for harm which have fortunately not yet effected successful lodgement in North America or have obtained only limited foothold and may still possibly be exterminated.

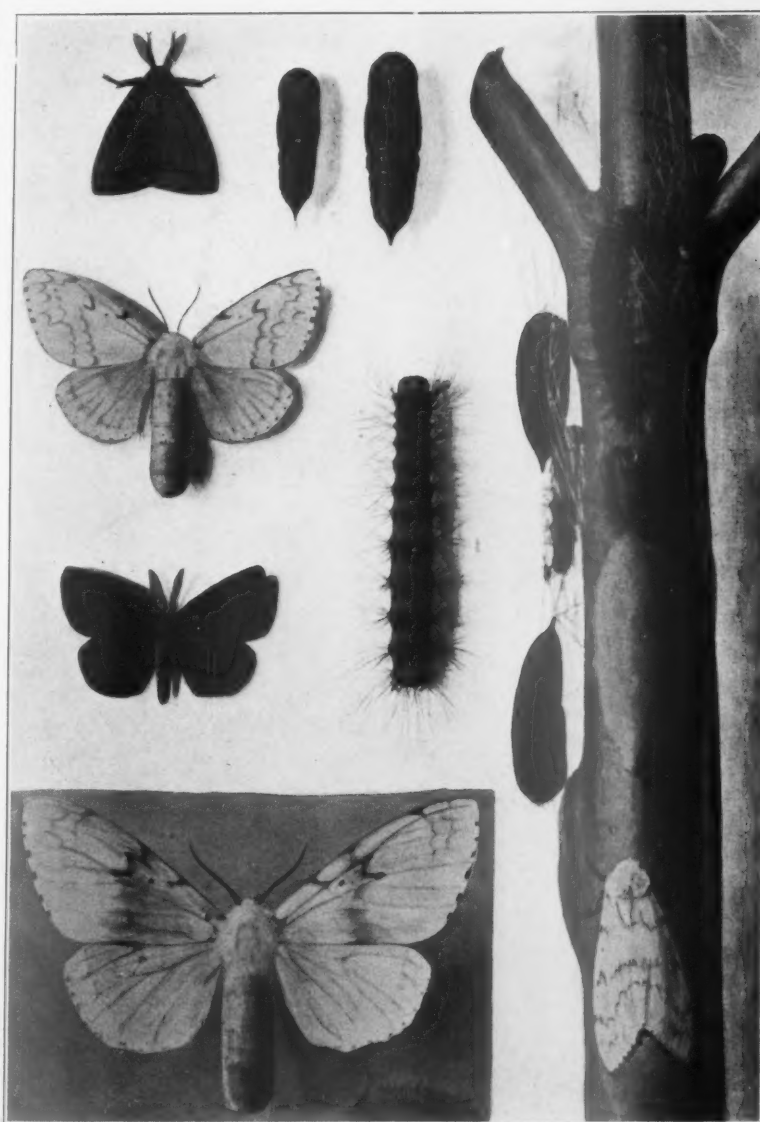
For the information of Federal and State inspectors the experts of the Department of Agriculture have prepared descriptive lists of the known plant enemies of the world, insect and fungous, which have not yet reached the United States or become permanently established therein. A manual describing the dangerous insects likely to be introduced into the United States, prepared in the Bureau of Entomology of the Department of Agriculture, and

PESTS DETECTED LAST YEAR

According to the report of the Federal Horticultural Board of the United States Department of Agriculture, one hundred and ninety-three different kinds of insects which might prove hurtful to American crops and one hundred and sixteen plant diseases of similar significance were detected by State and Federal inspection during the last fiscal year on plants and plant products offered for import into the United States.

Of the insects, fourteen were scale insects, such as Pear Scale, though they range from scales found on Orchids, Coconut, and Bamboo to other forms found on Wistaria, Camellias, Hemlocks and Pines. In addition, nests of the Brown-tail Moth, egg masses of the European Tussock Moth, pupæ of the Dagger Moth, and cocoons of the Pine Sawfly were discovered.

Of interest was the finding of a fourth potato weevil in the United States, which was discovered in Irish potatoes imported from the Andes. Of the diseases, Citrus Canker was found in a number of shipments, and the finding of Powdery Scab on wild potatoes from the east slope of the Andes is taken to indicate clearly that it is the home of this disease of the potato.—EDITOR.



VARIOUS STAGES OF THE GYPSY MOTH (*PORHETRIA DISPAR*)

The gypsy moth is one of the worst forest pests of Europe. It was accidentally introduced into Massachusetts 40 years ago, and has now spread to the adjacent States of Connecticut, Rhode Island, New Hampshire, and Maine. It has been recently brought into this country on imported stock and taken to such widely isolated points as Louisiana and Ohio. There is grave risk of its becoming distributed over the entire United States. It has already cost in New England, in mere efforts at control, a good many millions of dollars, and should it become widespread in the United States, damage from it would be beyond calculation.

now in press, lists and describes over three thousand distinct insect pests. Probably half of these are old-world insects injurious to forest and shade trees, and the balance, insects injurious to various cultivated crops. A similar manual is in preparation on the fungous diseases of the plants likely to be introduced into the United States.

Among the important insect pests thus listed, which we hope to exclude from the American continent, are such notable examples as the Mediterranean fruit fly, perhaps the most destructive of all fruit pests; and the pink bollworm of cotton, recently spreading from India to Egypt and thence to practically every other cotton-producing country of the world except the United States—an insect capable of doing vastly greater damage than the boll weevil. Among forestry insects occur such notable pests as the "nonne" moth of Europe, which is as destructive to conifers as the gypsy moth is in this country to deciduous trees; and many other forest caterpillars and bark-boring and wood-boring insects.

There are also known to occur in foreign countries



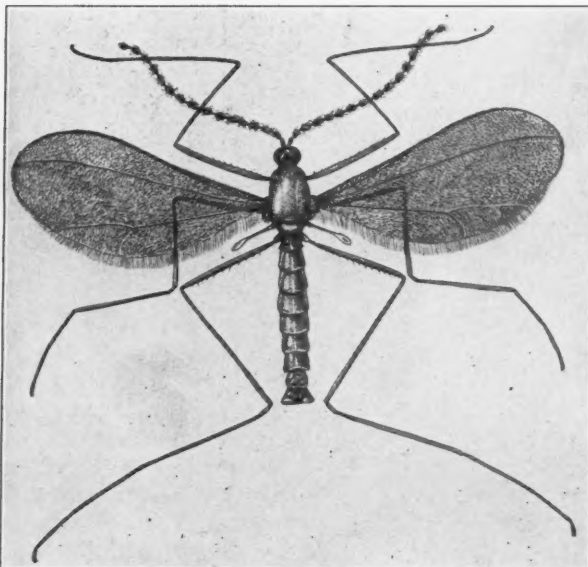
THE GYPSY MOTH PARASITE

These two wagonloads are an importation of gypsy-moth caterpillars from France in 1909, en route to the laboratory at Melrose Highlands, Massachusetts. These caterpillars were brought into this country for the purpose of introducing beneficial parasites to assist in controlling the gypsy moth.

many important diseases of plants which have not yet gained foothold on this continent. Prominent among these are the mildew diseases of the Indian corn occurring in the Orient; the potato wart, and many others affecting cultivated plants and forest trees.

DANGERS FROM NEW REGIONS

The increasing commerce of the world with the hitherto little explored regions of China and other Asiatic countries and Africa, Oceania, etc., adds enormously to the

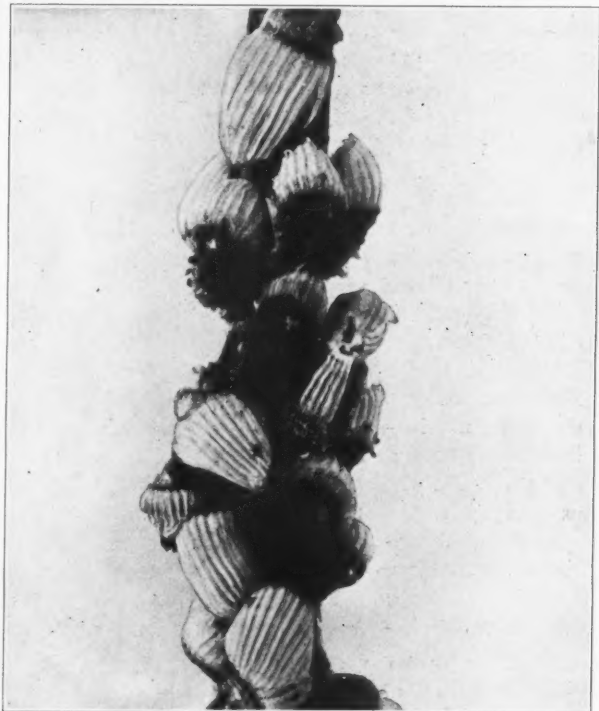
ADULT MALE HESSIAN FLY (*MAYETIOLA DESTRUCTOR*)

When excessively abundant this insect either destroys or badly injures hundreds of thousands of acres of wheat, reducing the yield from 50 to 75 per cent. This pest alone probably causes an annual loss in the United States of fifty millions of dollars.

risk of the importation of new pests. We know very little of the injurious insects of these new countries, but the importation of new stock in the last few years from these regions by the Department of Agriculture and by private agencies has especially demonstrated the existence therein of many very dangerous plant pests. The importance of these may be illustrated by referring again to some important pests now established in this country from these hitherto little explored regions of the old world. In this list comes the San José scale, the chestnut blight, citrus canker, and the corn mildews, introduced into some of our Southern States.

EXCLUDING THE PESTS

The more important of these known foreign pests are being excluded by regulating the entry of nursery stock, or, in the case of diseases, by an absolute prohibition of

THE FLUTED SCALE (*ICERYA PURCHASI MASK*)

Introduced from Australia and at one time threatened the entire citrus industry of the Pacific Coast. Fortunately, through the introduction and establishment of its natural ladybird enemy, *Novius cardinalis*, this pest is now under control, resulting in the annual saving of hundreds of thousands of dollars to the citrus growers.

the entry of the plants or fruits affected. There are now in force nine foreign plant quarantines forbidding the entry into the United States of various plants and plant products to prevent the entry of new and dangerous pests. Two of these have relation to forest pests, namely the white pine blister rust and the European pine shoot moth. The others relate to the potato wart; the Mexican fruit fly; the pink boll worm of cotton; the avocado weevil; certain injurious insects and fungous diseases of the sugar cane; citrus canker and other dangerous citrus diseases; and the downy mildews and *Phyodermis* diseases of Indian corn.

This Act also gives power of control within the United States of new and dangerous plant pests by quarantine or regulation of movement. This power is, however, now

limited by the necessity of actually determining the presence of the insect or disease to be quarantined against in the State or district made subject to the quarantine. An enlargement of this power to be able to effectively quarantine against such a widespread disease as the white pine blister rust is now being sought.

The powers of this act in relation to the exclusion of foreign plant enemies has hitherto been directed towards specific dangers which could be shown by the Federal or State experts in relation to particular plants or plant products. In view of the tremendous losses which are now being occasioned by introduced plant pests and the additional losses which are now threatened by the many new plant pests likely at any time to be introduced, as herein shown, it is perhaps opportune now to seriously consider the advisability of very much restricting the further entry of all foreign plants and plant products capable of being the agency of such introductions; in other words, to put all such introductions under definite Federal con-

trol and supervision, with power of exclusion wherever a reasonable risk is known. This need is emphasized just at this time by a number of important illustrations, already alluded to, of recently introduced pests, including the pine blister rust, chestnut blight, citrus canker, pink boll worm of cotton in Mexico, and a new peach pest from Asia which has scarcely yet come to public knowledge



PUPATING LARVÆ OF THE ASIATIC LADYBIRD (*CHILOCORUS SIMILIS*)

This beneficial insect, which is a voracious feeder on the San Jose scale in China and Japan, was introduced into the United States to assist in the control of this scale insect, and is helping to prevent destruction amounting to several hundred thousand dollars a year.

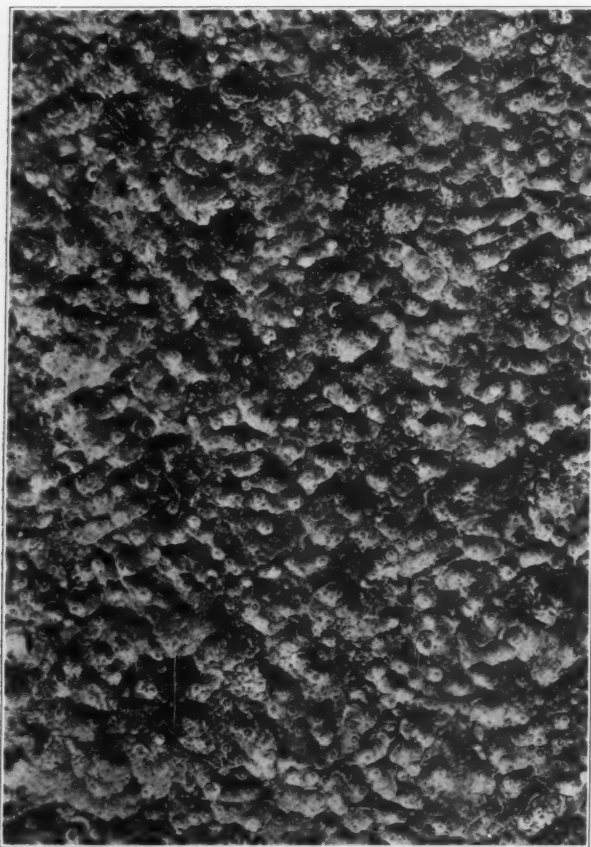


AN IMPORTANT NEW INSECT ENEMY OF THE PEACH
(*LASPEYRESIA MOLESTA*)

Observations during the summer and fall of 1916 seem to indicate that another formidable insect enemy of the peach and other deciduous fruits has become established in America. Larvæ of this insect have been observed injuring the twigs of peach, plum, cherry, and fruit of the peach. No. 1 shows a peach twig with a mass of dried gum and leaf fragments due to attack by the caterpillar. No. 2 shows a peach shoot cut open exposing the larva in its burrow. No. 3 shows the cavity excavated in the peach by larva entering at the side.

but which threatens our peach crop with greater losses than perhaps any of the older established peach pests. It would certainly appear that the enforcement of much more restrictive measures than are now possible is amply justified.

In this connection, and in relation to the natural desire to accumulate from the ends of the earth new field plants for our agriculture, and new fruits for our orchards, and the novelties and curiosities of the plant world for our gardens, lawns and parks, it must not be lost sight of that we have first to consider the safeguarding, that is, the conservation of the big commercial crops of America



THE SAN JOSÉ, OR CHINESE, SCALE (*ASPIDIOTUS PERNICIOSUS*) ENLARGED

Probably no other insect has received so much notoriety as this species. Its international importance is indicated by the vast amount of interstate and foreign legislation which has been enacted relative to it. Millions of dollars are expended annually in efforts to control this pest, which is so injurious to deciduous fruit trees.

such as wheat, corn, cotton, potato, apple, peach, orange, etc., and our enormous natural forests which are and must always remain our chief productions. The risk to these standard products of our soil with all introductions of allied or varietal plants, and especially such plants from the hitherto little exploited portions of the earth, is enormous, as the illustrations already given have shown; and therefore all introductions should be preceded by studies and explorations to determine the risk, if any, in advance of the importation; and such importations should, furthermore, be surrounded with all restrictions and safeguards necessary to prevent the entry therewith of new plant enemies. In other words, the safeguarding of our big established productions should be the first and leading consideration.

NATURAL GRAFT ON CORK ELM

By Guy Caldwell

DOES any lover of trees pass by a phenomenon known as natural graft without entertaining the wish to know just what accident or set of circumstances evolved to bring about the fortuitous growth? The cork elm (*Ulmus racemosa*) herewith was pointed out by the owner, Mr. Brockenbrough, on his summer place near Richmond, and its clean, healthy condition, together with the unusual symmetrical lines dividing the trunk with such nicety at once called forth admiration for the wonders of



NATURAL GRAFTING

This elm, on the summer place of J. M. Brockenbrough, near Richmond, is attracting considerable attention. The man in the picture is Guy Caldwell of Richmond, a tree expert.

nature. It is an interesting speculation to try and imagine just what incident in its life's history caused the union of these young branches after they had previously come to the parting of the ways. Perhaps they believed that "In union there is strength."

TREES WITH A HISTORY

IS there a tree with a history in your town? What do you know about it? Is it being cared for or is it being allowed to die? AMERICAN FORESTRY would like to know about such trees and would be glad to receive pictures and articles not to exceed 100 words about such trees. Such as are available will be printed in the magazine from time to time.

ADDRESS BY PRESIDENT CHARLES LATHROP PACK

In welcoming the members of the American Forestry Association, attending the Thirty-seventh Annual Meeting, and the United States and Canadian delegates to the International Forestry Conference at Washington, D. C., January 18 and 19, 1917, President Charles Lathrop Pack of the American Forestry Association said:

IN the name of The American Forestry Association, I welcome you to this Forestry Conference at Washington. You have come hither in answer to our invitation. Some of you have come long distances, and many have done so at the cost of considerable personal inconvenience. You are here to consider some of the vital questions of forest conservation, and the better protection and use of this great fundamental resource of the United States and Canada. Among the delegates appointed from Ontario and Quebec and from each of many States of this country, we recognize many familiar faces. You are experts in forestry and natural resources, and representatives of National and local organizations concerned in the development and use of the forests. Coming from Canada and from many States, this Conference is, in effect, a meeting of the representatives of the citizens of these States of the Nation and of the people of Ontario and Quebec.

THE FOREST AND PREPAREDNESS

This is a trying time with those who would protect the forest. New enemies are at work, and you are here to devise plans, ways and means to better protect the forests and better keep and use the great timber resources, which are so valuable and necessary to the economic progress of the United States and Canada. The conservation of the forests is an important factor in National preparedness in this country. If the great test of war comes to our people, it will be as vital to have natural resources available as to have men and ammunition.

We must have natural resources in abundance back of our Navy and our Army for adequate defense. The life of a Navy and of an Army would not be safe without it, and conservation, particularly of the forest and the mine and the soil, is a constructive principle essential to the end that we may be prepared.

I will not undertake before men of your wisdom and experience to discuss any of the details of the important questions you are here to consider. These will be taken up during your deliberations, and I congratulate you on the program you are to hear and consider.

THE WHITE PINE BLISTER

Expert investigation has established that the white and other five-leaved pines of the United States and Canada are threatened by the white pine blister, a fungus disease imported from Europe. Already the disease has been found extensively in New England and in most of the Eastern and Northern States of the white pine belt, and to some extent in Ontario and Quebec.

What you may here consider and determine will have a large influence and effect for better or worse on the future of the white pine, which is admittedly

our most valuable northern lumber tree, as well as one of the most beautiful. I need not urge upon you the importance of your deliberations.

THE WAR AND FOREST ECONOMICS

The great war in Europe has increased the importance of the economic value of the forest. Germany has ever been in the lead in the practice of dealing scientifically with these matters. One of the interesting mysteries of the present conflict is the source from which the Central Powers obtain the nitro-cellulose necessary in the manufacture of smokeless powder. This, as you all know, is ordinarily made from cotton. Germany does not now have access to the world cotton market. We have information which would indicate that in this emergency the nitro-cellulose used now by Germany is made from wood. The ordinary black powder is composed of fourteen to eighteen parts charcoal, made from certain varieties of wood. For strategic purposes, of course, smokeless powder is preferred on the battle-fields, but very great quantities of black powder are consumed daily by the contending armies.

We refer to rosin and turpentine, so largely the product of our Southern pine forests, as "naval stores," but now rosin is employed in large quantities in filling the space between the bullets in shrapnel shells, so that when the shells explode the missiles will be evenly distributed in all directions.

Gun-stocks, formerly made almost entirely from walnut, are now made from birch, red gum and other woods. Millions of such have during the past few years been made in America. The peculiar style of warfare which the great war has brought forth, necessitates the use of enormous quantities of timber for trench walls, trench floors, braces and stays. Millions and millions of feet are required for buildings behind the fighting lines, for hospitals, for housing non-combatants, for temporary storehouses and the like. Enormous quantities of forest products go into mine props, bridges and for other military preparations.

The ingenuity of Germany has taught her to make a soft and satisfactory absorbent as a substitute for absorbent cotton for surgical uses, and it is made from wood fiber or cellulose. Nowadays, enormous quantities of cordage and ropes and burlap, rugs and carpets are manufactured from wood fiber and wood pulp. Some may not know it, but many a person, even in this audience, is wearing articles of clothing that are now made wholly or in part from wood fiber. Some beautiful fabrics for ladies' evening wear are made largely of wood fiber and cellulose. The new uses and the increased old uses for the products of the forest increase the economic value of the forest, and add to the importance of all the questions

you are here to consider. The effect on the cost of paper is far-reaching, and of great economic consequence.

Germany was well prepared for this World War, and part of her economic preparation was seen in the fact that she has been unequalled in the perfection and practice of forestry. The care for years with which Germany has protected her timber, and her laws not only compelling in effect the replanting but making replanting profitable and, therefore, economically possible, are among the things that stand out in clear relief from the viewpoint of preparedness.

NO IMMEDIATE DANGER OF SERIOUS LUMBER SHORTAGE

There is no immediate danger, if we use our forests rightly, of a serious shortage

in our lumber supply, but the time is here when the conservation of our forest resources demands more serious and real economic consideration. It seems to me that the conservation of our privately-owned forest resources will never really become effective on a sufficient scale, until there is a prospective profit in practicing forest conservation.

Our great National forests, now under Government administration, should be supplemented to a greater extent by State and Municipal forests, as only the Nation, State or the Town can afford to hold forest lands in reservation, the cost of tax exemption forest management, and protection being a burden of all the people, and these properties thus free from the often heavy local taxation of privately-owned forests should be largely held in reserve until logs at the saw-mill are worth the cost of raising the crop.

CONSUMPTION AND PRICES OF LUMBER

The official Government figures show that the lumber manufacturer in 1915 received 10 per cent less per thousand feet for his product than in 1906. The average of lumber prices in 1916 at the saw-mills will average little more than those of 1915, and at Southern pine mills not as much as the prices of 1913; and this when the average citizen of this country uses over 400 feet of lumber yearly—more extravagant in the use of lumber than the people of any other land. The best estimate of lumber used in 1916 in the United States was about 42 billion feet as against 38 billion used in 1915.

The forest and lumber industry is the greatest of our

industries which has not greatly benefited by the World War. There are no war brides in the shares of Lumber Companies. Such low prices for lumber at producing points—away below the costs of reproduction through forestry methods—are against the interests desiring the conservation of these resources. You can't continue to have your cake and eat it too, when you buy your cake at less than the cost of raising the grain and sugar.

The values of the trees in the forest—stumpage values we call them—have in recent years steadily increased, but even at present prices forest trees at the source are the most reasonable crop that grows—cheaper, I believe, than wheat at 25 cents a bushel, or corn at 10 cents a bushel, or cotton at 5 cents a pound. Suppose that cotton or grain were century plants, like large pine trees; it would require a comptometer to compute the price of bread for breakfast.

You can't produce a dense population of men and a large stand of pine, or hard wood, on the same land. We raise a useful man in, say, twenty to twenty-five years. It takes very much longer to raise a tree useful for wide boards or timber. A boy usually produces little or nothing until he becomes of age. This is equally true of the tree raised for lumber of considerable dimensions. We have been a happy people in consuming forests that were here before we came, but now we must realize that timber like other crops must be worth the cost of production.

A BETTER PUBLIC UNDERSTANDING

A striking indication of a better understanding by the public of the problems in forest ownership and lumber production is given by the report of the Special Committee on Natural Resources of the Chamber of Commerce of the United States, which, through Referendum No. 17 of that organization, recommends legislation to permit coöperative agreements under Federal supervision in those industries which involve primary natural resources on conditions that the agreements tend to conserve the resources and promote the public interest. When trade organizations representing every phase of American industry vote in favor of these recommendations—as they have done—it is a most hopeful sign for an ultimate conservation of our natural resources through wise use.

THE announcement of the short practical courses in forestry and lumbering that will be given by the University of Washington, at Seattle, has just been sent out. These courses extend from Jan. 3 to March 30. Dean Hugo Winkenwerder, of the college of forestry, is in charge.

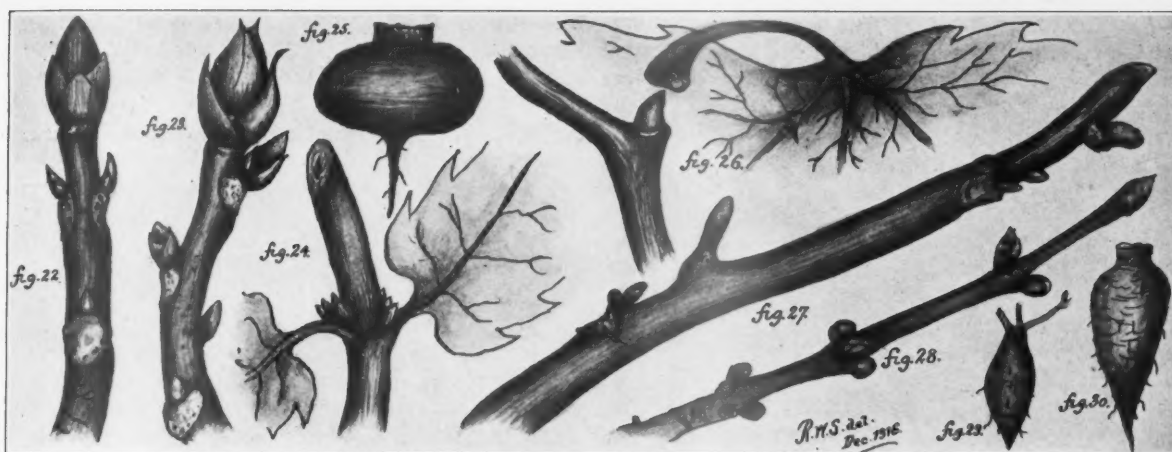
As these are short practical courses and arranged especially for young men who have not had a high school education and who can not afford to spend a long time at the university they offer an exceptionally good opportunity, for men regularly engaged in some form of woods work, and for those who intend to enter such work, to get a practical education.

* * * "This year we are increasing the work in the special course in 'Lumber and Its Uses.' This course is outlined with special reference to presenting this information for the use of persons engaged in office work at the sawmills, lumber salesmen, architects, engineers, builders and building inspectors."

TESTS at the Forest Products Laboratory, at Madison, Wisconsin, indicate that by the use of four additional nails in each end an increase of 300 per cent in the strength of canned food boxes is secured.

APPROXIMATELY 10,390 acres of denuded lands within the National Forests were reforested in the fiscal year 1916. The total number of trees planted was 6,146,637, while 8,280 pounds of tree seed were sown.

THERE were 133,442 more cattle and horses, and 605,338 more sheep and goats using the National Forests in 1916 than in 1915. This increase was in spite of large eliminations of grazing lands from the Forests. It is accounted for by improved methods of handling the stock and by more intimate knowledge of the forage on the ranges and their carrying capacity.



THE ILLUSTRATED GLOSSARY—BUDS AND ROOTS

Figure 22, one-year old horsechestnut shoot, autumn specimen, after the leaves have fallen; this shoot shows a *terminal bud*. Terminal buds are found on the ends of the stems and twigs of certain trees, shrubs, and herbs, and through their evolution and growth the prolongation of the stem takes place. They may easily be studied in the spring in the case of many trees, as the maple (Figure 28), the hickories, and the present subject. Below the terminal bud, on the sides of the stem or twig, we may notice certain small, triangular, naked places. Here is where the leaf-stalks came away the previous autumn. On the upper margins of these areas small buds are discovered; these are called *axillary buds*, as they occupy the axil of the leaf—the place where the leaf is attached to the stem. These axillary buds have a regular arrangement down the stem, as shown in the drawing; and in the case of the destruction of the terminal bud, a number of them may grow to become branches. In many shrubs and trees these buds do not start to grow until spring opens up, while in the sycamore (Figure 26) they may be covered all summer by a cup at the end of the leaf-stem (base of the *petiole*). In this connection, study Figure 6 of this article. Sometimes, as in certain honeysuckles, several of these axillary buds are grouped together, and when this is the case they are termed *accessory* or *supernumerary* buds. This is also found to be the case in various trees, as in the butter-nut (Figure 27), and here we find that one of the axillary buds is larger than the others, being removed to a point above them on the stem. In the red maple,

however, the axillary buds are seen to be placed side by side (Figure 28). The study of *buds* is extremely interesting, not to say important. Besides the above-mentioned *axillary* and *accessory* buds, we may also have *adventitious* buds, or those that do not occur regularly in the axils, but appear in other places on the stems in no regular order; they may be found even on leaves and roots. *Adventitious* buds may be *scaly* or they may be *naked*,—that is, without scales. Those that develop into leaves are called *leaf-buds*, but when they do not contain leaves but latent blossoms, they are termed *flower-buds*. One of the best ways to study buds and their development, is to watch them from day to day as they grow in the spring and early summer on plants, trees, and shrubs.

In the next month's *Illustrated Glossary* the subject of *roots* will be taken up; their terminology is quite as extensive as that of buds. Good examples will be given of those that are termed *fleshy* roots, such as carrots, parsnips, turnips, and radishes. Their simple, fleshy enlargements are really store-houses of food for the growing *perennial* or *biennial* herb. When such roots are broad and shallow, resembling some tops in form, they are called *turnip-shaped* or *napiform* roots (Figure 25); when they are elongate or cone-shaped, as in many species of carrots, beets, and parsnips, they are termed *conical* roots (Figure 30). Finally, we have the *fusiform* or *spindle-shaped* roots, or those like some radishes, which are more or less pointed at the extremities and enlarged at their middles (Figure 29). Still other kinds of roots will be taken up in a future number.

EARLY SAXIFRAGE, BLOODROOT, AND JACK-IN-THE-PULPIT

BY DR. R. W. SHUFELDT, C. M. Z. S., EDITOR OF THE DEPARTMENT OF FLOWERS

AS winter retreats northward before the steady advance of the ever-increasing warmth of approaching spring, we have a season at hand that rivals any other time of the year in which to ramble over fields, and tramp through the woods with our collecting outfit. Every part of the latter, since the days of the preceding autumn, has lain neglected in some corner of the naturalist's sanctum, patiently awaiting the advent of the first bird migrant; the awakening of the earliest flowering plants; the chirruping of the merry cricket frogs in the ponds and ditches, and a thousand other happenings afield, which, combined, render this vernal season the most delightful of the year. An April-tempered breeze sends the dried and tan-colored fallen leaves of the previous season scurrying before you along the edge of the oak and chestnut woods, exposing here and there a patch of bright green fern leaves; a spray of early arbutus; a few brilliant partridge berries, not to mention a dozen other peeping sprouts of as many different kinds of growing things, making ready to put in as early an appearance as possible.

Ah! There are some charming little Spring Beauties—surely they have been in bloom for a week at least. We all know them; and some of us may even remember that they were named *Claytonia* in the honor of that good, old, American botanist, John Clayton, while the two species of the

genus have received the names of States, being known as *Claytonia virginica* and *Claytonia caroliniana*. But these must be described some other day; for right here, in this deep ditch to my left, I spy the first specimens of Early Saxifrage seen thus far; so my faithful, old-time, five by eight camera is brought into position, and the result here reproduced in Figure 1 is secured. Like the Spring Beauties, Early Saxifrage—the two best-known species of it—is found in suitable localities over most of the upper half of the United States, and have been named specifically for States, as *Saxifraga virginiana*, and *Saxifraga pennsylvanica*. As a family, however (*Saxifragaceæ*),—that is the Saxifrage family,—it is more extensive than this; for it contains in the genus a very large number of herbs and shrubs. They are related to the Rose family (*Rosaceæ*), and are represented by the Mitreworts, Alumroot, and their various allies. Asa Gray, for example, describes an even dozen species of Saxifrage for us in his last "Manual": while in some of the earlier botanies only two species are mentioned—the ones named above.

Saxifraga, be it known, is compounded of two Latin names: *saxum*, a rock, and *frangere*, to break or fracture; this for the reason that the plant is often seen growing in the clefts of rocks in the woods. From this fact, some botanists go so far as to say that they always grow in such clefts; while, much to my surprise, I find that we still

have writers on flowers among us who actually believe that the roots of this delicate little plant rend the rocks asunder. Even the close observing Germans call it a "stone-breaker" (*Steinbrech*); while Alice Lounsberry says, in her "Guide to the Wild Flowers," that "we find

dead leaves, semi-frozen ferns, and frost-nipped vegetation of the year before, with not a single sign of a rock in the neighborhood.

Neltje Blanchan believed no such tale, for she says of the Early Saxifrage: "Rooted in clefts of rock that, there-



WHERE SAXIFRAGE THRIVES

(Slightly reduced)

FIG. 1.—Early Saxifrage (*Saxifraga virginiana*), one of the first flowering plants of the spring, sometimes appearing as early as the first week in March; they grow to be from four to ten inches in height. The dark-green leaves are arranged in a rosette near the ground. Their foot-stems are short and broad, while the leaves themselves are oval in outline, rounded distally, with scalloped edges; they are smooth and somewhat thickish. Petals white, five in number, the flower being small, with ten bright yellow stamens. Stem stout and downy; rises from the middle of the leaf rosette. As the main stem lengthens, the separate flower-stems branch and elongate, until the growth as a whole has a much looser appearance and actually is more spreading on this account. The flowers may remain in bloom for two or three weeks, during which time different species of bees and two or three species of butterflies perform the required cross fertilization.

it on the top, or in the clefts, of rocks, which it has been known to break asunder. In fact, to watch this little plant is a moral lesson in the achievements that can be brought about by quiet will power." Of course, this is but a fabulous tale, and our pretty little plant plays no such part in nature. Indeed, I have far oftener met with it growing in just such situations as I photographed it in on the sides of a deep ditch, coming up among the



FLOWERING BLOODROOTS (*SANGUINARIA CANADENSIS*)

(Slightly reduced)

FIG. 2.—A white-petalled, yellow-centered flower of general range in eastern United States. It is entirely without odor, and grows, as seen in the illustration, on a naked scape of no great height. Pistil single; stamens numerous. This curious plant has but a single leaf that springs from the fleshy root-stock close to the base, the latter containing the same kind of red juice that is found in the stem. There is a short style and a two-grooved stigma, while the ellipsoidal pod is one-celled and two-valved. The seeds are conspicuously crested. In Europe and in northern Asia this low, perennial plant is called the "tormentil," and its juice, which is rich in tannin, is medicinally used as an astringent. Housewives in this country often keep a small bottle of it on hand to drop on sugar, and children are given this when suffering from colds. In general medicine its alkaloid, *sanguinarin*, is sometimes employed as an expectorant, an emetic, or even as a stimulant.

fore, appears to be broken by this vigorous plant, the saxifrage shows rosettes of fresh green leaves in earliest spring and soon whitens with its blossoms the most forbidding niches." This is distinctly contradicted by Ellen Miller and Margaret Christine Whiting, in their "Wild Flowers of North-Eastern States," when they say: "The roots of this hardy plant, pushing in among the crevices of the rocks, fracture them by their vigorous growth." And so

it goes. It would be quite an interesting point to settle, when Early Saxifrage appears this spring, were some reader of this controversy, as I have presented it here, to photograph a growing specimen of this plant in some rocky crevice, where it might prove or disprove this variance of opinion among botanists at the present time.

Early Saxifrage blooms from the first week in March to well into May in the middle of its range, the plant occurring as far north as New Brunswick, thence southward to southern Georgia, and westward through the valley of the Mississippi. F. Schuyler Mathews tells us that "the buds are formed early, and appear like little (fine-haired) balls in the center of the rosette-like clusters of obovate leaves close to the ground. Eventually a cluster expands to a branching, downy stem (Fig. 1), bearing many little white, five-petaled, perfect flowers, with ten yellow stamens. The flowers are succeeded by rather odd and pretty madder purple seed-vessels which are two-beaked; often the color is madder-brown." Mathews is another botanist who distinctly denies that the roots of this little plant have the power to fracture rock; at least he says so of the Swamp Saxifrage, which is, by the way, a larger plant with greenish-white flowers.

THE BLOODROOT

About a week or ten days after the Early Saxifrage is in full bloom, we have the advent of another of our most lovely, not to say most interesting, wild flowers of spring, the Bloodroot, associated with all that the early spring woods have in store for us. The picture, Figure 2, presents a whole lot in the history of this famous plant. In the first place, it shows at least one kind of locality in which they flourish; it is on the almost vertical bank of a miry ditch, where I disturbed not a single dead leaf, twig, or

stick before making the exposure. We see here the flowers of the bloodroot in every stage of their development, as well as their gradual departure after enjoying the most transitory existence, which is more transitory, mark you, than that of any other early flower of our forests and glades. Note the gorgeous specimen in full bloom; the two that are losing their glistening white petals, and the one between them where all the petals are gone but one. Above these we see the two opening buds, and a closed bud between them, nearly shut out of sight.

We have but one species and one genus of Bloodroot in our flora. As *Sanguinaria canadensis* it has been arrayed among the poppies or in the Poppy family (*Papaveraceæ*). As every one who has ever picked a Bloodroot knows, the juice of the plant is of an orange-red color, hence its name—generic name—*Sanguinaria*. In former times, this juice was much in use by some of the American Indians as a stain for their faces, and for certain of their trappings, tomahawks, and arrows. It washes off with great difficulty, and I have seen the evidences of it upon children's fingers a week after they plucked the flowers. This will account for other names which have been bestowed on the plant, as "Indian Paint," "Red Puccoon," and "Indian Plant," with possibly others in other parts of the country where it is found.

Where Bloodroots are seen to the best advantage is upon some dark-soil hillside, sparsely timbered with various trees of the forest. They commence to put in an appearance early in

April, after the first spring winds have blown many of the last year's dried leaves off the most exposed areas in the woods. It is then we note, some fine morning, their first appearance as they send up in many places the first evidence of their awakening. That elegantly curled-up leaf there, enclosed in its tissuey bract,



JACK-IN-THE-PULPIT (*ARISÆMA TRIPHYLLUM*)
(Slightly reduced)

FIG. 3.—This is one of those having the dark purple, light-striped spathes, which arches over the still darker, club-like spathe seen within. Between the plant and the poplar tree near it, is seen growing a fine May flower plant (*Podophyllum peltatum*), and the leaves of the two must not be confused. The Indian Turnip has but two, and far above that which many take to be the flower of the plant. Jack-in-the-pulpit flowers are, however, known to but few observers, for they are exceedingly small, and situated at the base of the spathe which folds around them. Just above where the tiny florets are found, the club-like spathe becomes suddenly enlarged, thus forming a chamber in which many an insect is entrapped and loses its life. A good account of these tragedies is given in "Nature's Garden" by Neltje Blanchan (p. 368), and it forms most instructive reading for the young botanist. Unfortunately, the story is too long to reproduce in this place.

is a splendid specimen of the plant as it forces its delicate tip into the realm of day, to enjoy its interesting life-cycle. On it comes, straight as an arrow, through the dark soil. When lo! after it has attained a height of some five or six inches, the round, rich, silvery-green and deeply-lobed leaf unfurls, gradually opens out, and exposes to view the treasure it has so well protected. This is nothing less than the future flower—a rather thickish, spindle-shaped bud, which reveals, as soon as it is well above the expanding leaf, its ten or dozen snowy petals, spreading quickly out into a gorgeous star, that may be seen against the dark earth at a long distance, forming, with its many neighbors, a superb floral galaxy indeed.

These delicate flowers last but a very short time—maybe not more than a day or even less; the first stiff spring breeze sends the whitest points in all directions, as it sweeps over the frail band. Still, recruits continue to come up, and bloodroots may be found in one place or another until May is pretty well along—the atmospheric temperature having not a little to do with it.

These flowers secrete no honey, so the insects visiting them leave unrewarded for the important service they perform in the matter of fertilization; bees and certain flies are their chief benefactors in this respect.

Bloodroots close up at night, the closure being accomplished by the petals all rising together, their outer points meeting above the inner structures of the flower, thus protecting them from the chilly air of the nights and evenings of the early spring. This plant is an interesting one to study, if obtained just as its tip appears above ground in the spring, and transplanted to a suitable box filled with rich earth, to be kept on some sunny window-sill at home; in this way all of its peculiarities may be observed at one's leisure.

Spring is now well along in the northern States east of the Mississippi, and many flowers have bloomed and disap-

peared as one of the most remarkable plants we have makes its appearance; this is the Jack-in-the-Pulpit, also called Indian Turnip. It occurs in moist woods, and often along the banks of sluggish brooks and streams in deep, dark woods. Occasionally, numbers of them thrive in

thickets where the ground is moist and soft. Botanists have placed it in the Arum family (*Araceæ*), and christened it *Arisema triphyllum*, or an arum that is stained as though with blood (Greek). It has but one close relative in our country, the Green Dragon or Dragon Root, found in the same genus—a plant with a history.

Frequently I have photographed the Jack-in-the-Pulpit, both the fruit (Fig. 4) and the flower (Fig. 3), and I have studied this plant under many conditions, in nature as well as in boxes kept in my study. In the Middle Atlantic States we may look for them along in April; and if it be very early, we may brush the dead leaves and sticks aside in the localities where they grow, when, sooner or later, a pale green, sharp-pointed little cone will be seen sticking up in the mire or damp earth. If this be not a May Apple (*Podophyllum peltatum*), it is almost certain to be sprouting Jack-in-the-Pulpit. Right here, my



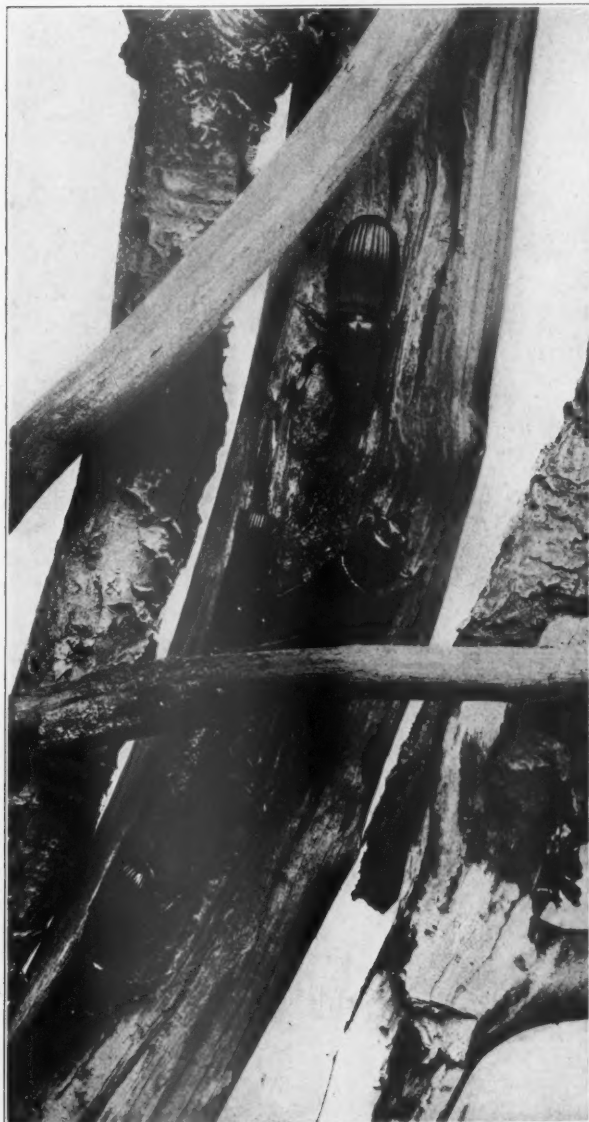
THE BRILLIANT SCARLET FRUIT OF THE JACK-IN-THE-PULPIT
(Slightly reduced)

FIG. 4.—There are two plants represented here, collected in southern Maryland on the eleventh of September, 1916. These fruit bunches, containing the ripened seeds of the plant, were originally dark green, and very shiny; they only became red upon ripening. If this be done on the part of the plant in the hope that seed-eating or other birds may carry them off, and, finding the berries unfit to swallow, drop them far from the parent plant, where they perchance may start a new colony, that hope is possibly realized, though we have no evidence of the fact. Gnats of the genus *Mycetophila* are the insects principally responsible for the fertilization of the Jack-in-the-Pulpit, though probably other forms also are. Mathews says that the plant "is possibly developing a dependence upon insects for fertilization; but often one plant develops both staminate and pistillate flowers." The last word about this member of the Arum family apparently has not been said.

Some should be reared in the sunlight; others in deep shadow, and still others under varying conditions. Notice the root as you plant it; it is called the *corn*, and it is a turnip-shaped affair, rich in farinaceous matter. So bitter is its juice that, if bitten, it will blister the tongue and lips. School-boys call it the "Memory roots," for you are likely to remember it should some young scamp get you to bite it. Boiling removes this acidity entirely, so the early Indians, after thus cooking it, used it as food, as they used the bright scarlet berries which constitute

its fruit (Fig. 4). Hence "Indian Turnip," as before noted.

This plant grows rapidly, its erect stem (scape) being pinkish and green as it shoots upwards; and the plants vary greatly in height, from a few inches to a foot and a



(Photograph of living insects by the author. Specimens collected by Master Edward E. Court, near Washington, D. C.)

HORN PASSALUS OR HORN-BUG (PASSALUS CORNUTUS)

FIG. 5.—Four specimens are seen in the illustration, and the forward-projecting, tiny "horn" is plainly seen upon three of them. These beetles belong to the family *Lucanidae*, members of which are known as Stag-beetles or Stag-horns, their branching mandibles being compared to the antlers of a stag. The common Stag-beetle is *Lucanus dama*, and it is also found in decayed tree-stumps of certain trees, as the apple, oak, and others.

half and more. At first this stem is sheathed in the two leaves; but the latter soon open and grow far above the part containing the flower. Each leaf is divided into three ovate, pointed leaflets, and are of a dull green color. In some specimens these leaves grow to be of enormous size and length. Where the leaf-stems part company they are sheathed, and from between the sheaths springs the stem of the floral part (Figs. 3 and 4). This latter consists of a hood or *spathe*, within which we find a soft, club-like wand or *spadix*. The spathe varies in its coloration, being

sometimes a beautiful pale green, with delicate longitudinal stripes. Again, it is a dark rich purple, with pale yellowish stripes. It is surmised that the former has grown in the bright sunlight, and the latter where they have been deprived of it.

The minute flowers of the Jack-in-the-Pulpit are greenish-yellow in color, and are clustered about the base of the spadix. The arrangement can be easily studied by taking a fresh plant and splitting the hood or spathe, down the side as far as the stem. Doctor Torrey believes that those very light-colored ones, or where the flap of the spathe is very light-colored, are sterile plants, while the fertile ones have the dark purple spathes. This is an opinion at variance with the one expressed above, but it may none the less be the correct one. In any event, late in the summer the ripened seeds form a bunch on the summit of the stem, about as big as a large horsechestnut or larger, being at first of a very dark green color, and later a magnificent and brilliant scarlet, rendering the plant so conspicuous that it may be seen at some considerable distance in the woods (Fig. 4). Additional information in regard to this plant is set forth in the legends beneath Figures 3 and 4.

Personally, I have never collected the near relative of the Jack-in-the-Pulpit, the Green Dragon or Dragon Root (*Arisæma dracontium*); but a good account of it may be found in any general work on our wild flowers. Next summer I will probably be able to present a reproduced photograph of a specimen here.

In the damp woods where we find the Jack-in-the-Pulpit flourishing in the spring, we often come across a great log of a fallen pine tree, or perhaps that of an oak. Upon tearing off the loosened bark of this, all the evidences of the decayed trunk are in view. A large larva is also to be seen in the pulverized, rotten wood and bark, while channels, borings, and grooves run in all directions, having been cut not only by the larva, but by the adult insect itself. These insects are soon to be seen, and many a collector has asked me the name of them. They are known in entomology as the Horn-Bugs or Horned Passalus (*Passalus cornutus*), and very elegant beetles they surely are (Fig. 5).

PENNSYLVANIA TREE PLANTING

THAT the 5,000,000 acres of barren land in Pennsylvania can be reclaimed by reforestation is finally established by reports given out by the Pennsylvania Department of Forestry. These reports cover the planting of 21,000,000 trees on 13,000 acres of State Forest land. Pennsylvania set a record last year when almost 6,000,000 trees were planted in one season, and a single plantation was made which contained over half a million trees. The nurseries will produce many more trees this year, but the work of planting will be hampered considerably by scarcity of labor and lack of funds.

FOREST products of Finland now constitute 70 per cent of the total exports or \$96,500,000 and the government has appointed a committee to look into ways and means for better preserving the forests and enhancing their yield.

THE LOCUSTS

IDENTIFICATION AND CHARACTERISTICS

By SAMUEL B. DETWILER

By a curious power of alchemy, the locusts transform the nitrogen of the air into a fertilizer that greatly enriches the soil in which they grow. This transformation is brought about by bacteria that live on the rootlets and extract nitrogen from the air through complicated chemical processes. Many other members of the Pulse family, which contains over seven thousand distinct species of plants throughout the world and about fourteen hundred in North America, have the same property. The plants in this great group range from small herbs to great trees, and some of them, such as peas, beans, clover and alfalfa furnish highly valuable food for human beings and animals. Others supply important vegetable dyes, including logwood and indigo. Senna and other medicines are also obtained from members of this group.

All of these plants are called legumes or pod-bearers because their fruits are pods on the order of those borne by the common cultivated varieties of beans and peas. The acacias are well-known pod-bearers, closely related to the locusts. A species of acacia furnished the Shittim wood, or "incorruptible wood," mentioned in the Bible as the material used in constructing the Ark of the Covenant and the Altar of the Tabernacle. It also provided the thorns for the

crown of Christ. The Buddhists and the Hindus regard the wood of the acacia as sacred, and burn it on their altars. Chinese doctors place acacia seeds in a vessel and cover them with ox-gall. After these seeds have been dried in the shade for three months, they are prescribed to clear the eyesight, keep the hair from turning gray and to cure hemorrhage. The ancient herbalists are con-

sidered to have given us the foundations of modern botanical science. These learned men carefully observed the marks or signs on various portions of the plant structures, and claimed they could thus determine the medicinal virtues of plants. The acacia was known to them as a plant identified with the eyes and was assigned for use in various eye troubles.

The black locust (*Robinia pseudacacia*), better known in Europe as the false acacia because of its resemblance to the true acacias, is a native of North America. It originally grew in the Appalachian Mountains from Pennsylvania to Georgia, and in eastern Oklahoma and Arkansas. It has been planted throughout the United States, except the extreme southern portion, and in many places it has escaped from cultivation. It is named Robinia in honor of Jean Robin, Director of the Garden of the Louvre, who introduced it into



THE BLACK LOCUST

The characters which identify black locust in summer and winter: (1-2) twigs bearing leaves, flowers, fruit pods and seeds, and (3) a twig as it appears in winter, armed with stout prickles. Sections of winter twigs (4 and 5) enlarged, showing several buds in the protected cavity between the spines.

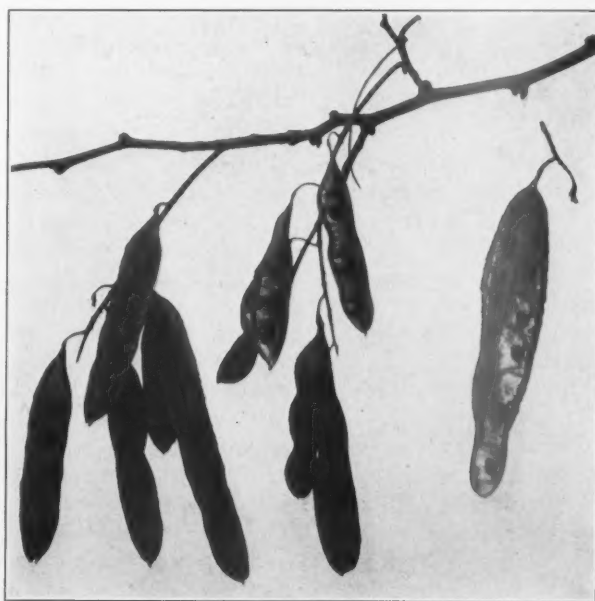
France about the year 1600. The black locust was one of the first American trees to be planted in Europe, and at once became fashionable for its beautiful flowers and foliage. Later, its culture was neglected until near the close of the eighteenth century, when its value as a timber crop and soil improver was recognized. In 1786, de Crève-Cœur presented a paper before the Agricultural Society of Paris, eulogizing the black locust and giving facts about its culture and uses in the United States. According to this writer, the colonists learned very early of the value of this tree and Massachusetts offered prizes for the best plantations. He mentions a farmer of Long Island who planted 14 acres of pasture land to black locusts and gave the plantation no care except to keep out cattle. Twenty-two years later he sold some of the wood to a ship's carpenter for £260 8s. 4d., and three years later he obtained a similar sum from the sale of additional timber from the planting. De Crève-Cœur continues:

"The Americans think so highly of this tree that I have heard many colonists express sentiments to the following effect: 'May Heaven grant that when I die, I may be able to leave to my children 50 acres of land planted with acacias, and well enclosed! My house may be destroyed by fire, my harvest may fail, the contracts I hold be violated by cross events and bankruptcies—whatever else I may have may perish—but if I live long enough to accomplish this great object of my wishes, I shall have no reason to dread death. My family will be secure and will find in this



BARK OF BLACK LOCUST

The bark on trunks of black locust trees of all ages is thick and rough, varying in color from reddish brown to dark gray, and separated into heavy, rounding ridges.



EASILY DISTINGUISHED BY ITS FRUIT

The fruits of the black locust are straight, dull-brown pods, two to four inches long. They split open easily, exposing from four to eight flattened, smooth brown seeds. The seeds ripen in the autumn but many of the pods hang on the trees until the following spring.

treasure all the resources that they may require in order to enjoy a sufficient competence.'"

It was decreed during the French Revolution that May sixth of each year should be consecrated to the black locust, and the following description appeared in the Cultivator's Year Book, for use in the schools:

"Acacia (false), a large spiny tree, a native of North America. It grows rapidly; its foliage is very graceful and casts a light shade; its flowers are white and very odoriferous, and a useful syrup is made from them; the young shoots are good for cattle; the root is tender and saccharine, having the scent and flavor of stick liquorice; the wood is veined and hard, it splits readily and does not decay when exposed to the action of either air or water. It is used for hop poles, vine props, mill work and other machinery. In America it is preferred for the stern posts and knees of vessels."

The black locust is a medium-sized tree, seldom attaining its maximum size of 80 or 90 feet in height and 3 or 3½ feet in diameter. Average mature trees are 50 to 60 feet high and 18 or 20 inches in diameter. Trees growing in the forest have straight, slender trunks, clear of side branches for most of their length and forming a narrow, oval top. In the open, black locust usually branches low or divides into several stems; the top does not spread widely, and is open, rounded and irregular. The bark on trunks of trees of all ages is thick and rough, varying in color from reddish brown to dark gray, and separated into heavy rounding ridges that are free

from surface scales. The leaves are 8 to 14 inches long, and consist of smooth-margined oval leaflets, each about one-half inch in length, arranged in pairs on the sides of the leaf stems with a single leaflet at the tip. At night the leaves droop to prevent excessive evaporation of moisture from the leaf-surface. A little lad who had noted this habit, once objected to going to bed early because the locust leaves "had not yet said their prayers."

Two little spines at the base of the locust leaf-stalk take the place of leaf-like appendages found at this point on many other kinds of trees. These prickles are stout and sharp, like those on the stems of rose bushes, and help to protect the tender leaves from browsing animals. A hairy cavity between these spines contains 3 or 4 tiny buds so small that they may easily pass unnoticed during the winter, but they enlarge in the spring and become plainly visible. Only one bud at a time develops into a shoot; if this shoot is killed, another bud starts to grow. Thus Nature enables the locust

trees to replace twigs and branches which are frequently lost through damage by cattle, wind or insects, and this fact accounts, in part, for the scraggly appearance of many old trees.

The glory of the black locust is in May or June, when masses of creamy white blossoms transform even the most unsightly tree into a bower of beauty and perfume. The flowers resemble those of the garden pea in size and shape, and are borne in drooping clusters, 4 or 5 inches long. Usually, they appear after the leaves, and the bright green foliage furnishes a rich setting for the exquisite blossoms. By the end of summer, each flower has matured into a thin, dark brown pod, 2 to 4 inches long, half an inch wide, enclosing 4 to 8 flattened, smooth, brown seeds. These seeds may be sown in the fall, but a better plan is to store them in a cool, dry place over winter, and sow them in the spring, after danger of frost is past. Unless water heated nearly to the boiling point (from 160° to 180° F.) is poured over them at this time, and the seeds then allowed to soak for some hours until they

swell, many of the seeds are apt to lie dormant until the following year. Treated in this manner and immediately sowed in rich, fresh soil, the seeds germinate well and the young trees are frequently from two feet to six feet high at the end of the first season's growth.



THE BEAUTIFUL BLOSSOMS OF BLACK LOCUST

The glory of the black locust is in May or June, when masses of creamy, white blossoms transform even the most unsightly tree into a bower of beauty and perfume. The flowers generally appear after the leaves, and the bright green foliage furnishes a rich setting for the exquisite blossoms.

the trees are uprooted, since small roots that break off send up abundant sprouts.

Black locust develops rapidly when young, growing 2 to 4 feet in height and one-fourth to one-half inch in diameter yearly, but its rate of growth begins to slacken when it is 15 or 20 years old. It thrives on moist fertile soils, such as river bottoms and coves or ravines in the mountains, and it appears to have especial health and vigor on soils well supplied with lime. It will also do well on poor soils, such as sandy land or rocky slopes—in fact, almost any soil except a wet, heavy, sour soil is adapted to it.

Foresters in Hungary have said that "the locust has been discovered in America especially for the Hungarian plain." Dr. Gifford states that in Europe the black locust is free from its greatest enemy in America—the locust borer. This insect riddles the trunks and branches of black locusts; if it does not kill them outright, it retards their growth and causes them to break and become worthless. Individual trees may be protected from this insect by soap emulsions or lime washes, applied to the

No other broad-leaf tree, except the chestnut, compares with the black locust in its ability to send up vigorous and abundant sprouts. These sprouts spring principally from the roots when a tree is cut down, and they are also produced whenever the roots of standing trees are cut or injured. At one time it was customary to plant rows of black locust trees about 50 feet apart, and the following year plow furrows three feet from the rows. Locust sprouts would spring up along the edges of the furrows, and by repeating this process each year it is claimed that a thrifty plantation was secured at little cost. The sprouts are sometimes so numerous and form such dense thickets, that the trees cannot make a good growth. It is difficult to destroy a black locust plantation even though

trunk and branches before the time the mature beetles lay their eggs in August. The beetles feed on golden rod, and may be collected and destroyed. The expense of special treatment to control the borers is prohibitive in the case of plantations. Therefore, unless careful observation indicates that the black locust will not be seriously



GROWTH FROM SEED PLANTING

Black Locust Grove in Southern Indiana, only nine years old, from seed. Poor soil in an old pasture was ploughed up and seeded to locust nine years before this photograph was taken. Cultivation was given the first year, after which it was neglected and the cattle permitted to enter the plantation. The grove was thinned twice. An estimate of the timber, as shown in the photograph, established the fact that there were 394 trees per acre, estimated to yield 1,028 fence posts, worth 20 cents each on the ground—a value of more than \$20 per acre per year.

injured by its most destructive pest, it should not be set out in plantations. In certain localities the borers have not yet become numerous enough to harm the locust trees to any great extent; this is true especially of Oklahoma and the states west of the Rocky Mountains.

Another insect, a leaf miner, has caused much damage to locusts in portions of the eastern United States. This insect causes the leaves to turn brown, as though scorched by fire. Young trees seem to suffer most, and are weakened so that they easily die from other causes. The remedy is an arsenical spray, but this is practical only in the case of shade trees. A fungus known as the yellow-rot is very destructive to the heartwood of living trees, and is the cause of the hollow trunks of so many old black locusts. Another heart-rot, the sulphur polypore, is a very destructive disease that sometimes attacks this tree. The fruiting bodies of these fungi are shelf-like growths that push their way through the bark.

The wood of black locust is very hard, stiff, strong and durable. Its extreme hardness is due to minute crystals, which soon dull the edges of cutting tools. It is coarse grained and splits readily. The heart wood is yellowish brown and for this reason the tree is frequently called yellow locust. Sometimes the wood has a dark reddish brown or greenish tinge. The sapwood is yellowish white, and forms a very narrow band around the heart wood; it does not resist decay like the latter. The principal uses of the wood are for fence posts and rails, insulator pins for telephone and telegraph cross arms, tree nails and the hubs of carriage wheels. Under average conditions, locust posts will last 20 to 35 years, and accordingly, they have

a high market value. The wood makes excellent fuel, and is also valuable for railroad ties and the ribs of vessels. It does not enter largely into manufactured lumber because the supply is limited, and is used for the special purposes to which it is best adapted. The bark of the roots is poisonous when eaten in large quantities, but in small doses it is used as a tonic in homeopathic medicines. Black locust leaves furnish a principle similar to that from which indigo is obtained, but it is not known to be of commercial use.

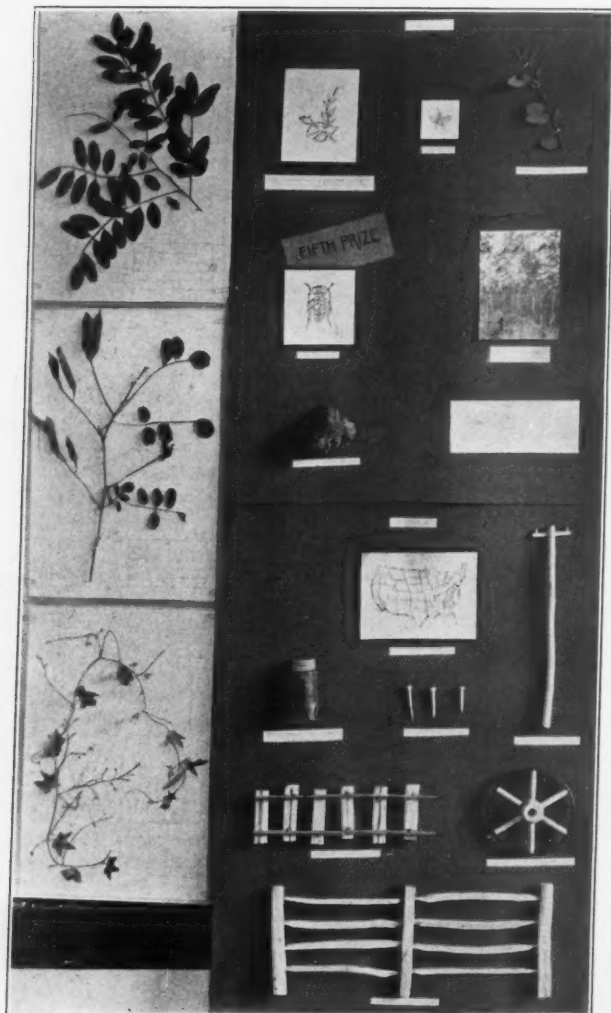
A spineless variety of black locust has a darker colored foliage than the common form. The clammy locust



WITH OR WITHOUT THORNS

Honey locust branches low and forms a spreading, rounded top when growing in the open. The lower branches extend at nearly right angles to the trunk, and the beauty of the tree is emphasized by the light and graceful foliage. The trunk and older branches usually have strong thorns, but a variety free from thorns is available for planting where thorns are objectionable.

(*Robinia viscosa*) is a small tree or shrub of the North Carolina mountains. It is so named because the twigs and leaf stems are coated with a sticky substance. Its flowers are pale rose color, larger and blooming later than those of black locust. The bristly locust or rose acacia (*Robinia hispida*) is another shrub or small tree that grows wild in the Southern Allegheny mountains. It is very prickly, and has large and very beautiful rose-colored blossoms that appear in June or July. It is much planted for ornament, and does well on sandy soils and near the sea shore, but may become objectionable because of its abundant root suckers. The New Mexican locust (*Robinia neo-mexicana*) is found in the semi-arid portions of southern Utah, Colorado, Arizona and New Mexico. It is more of a shrub than a tree, but produces handsome



HOW CHILDREN STUDY TREES

Black locust exhibit, illustrating the life history and commercial uses of this tree. The exhibit won a prize in a tree contest in a Washington, D. C., Normal School.

flowers and is valuable for conserving rainfall on the dry slopes on which it grows.

Honey locust is a title sometimes given to the black locust in New England because of its fragrant, honey-laden bloom. The true honey locust (*Gleditsia tricanthos*) differs in so many respects from the Robinias or true locusts that botanists give it a separate classification, but the leaves, fruit and wood show that they are closely related. The honey locust may have a single leaf-stem, 7 to 9 inches long, furnished with 9 to 14 pairs of leaflets, or the leaf-stem may divide into 8 to 14 branches and each branch bear 9 or 10 pairs of smaller leaflets. Honey locust leaflets are in pairs the entire length of the stem, while black locust has a single leaflet at the tip of the stem bearing the paired leaflets. Black locust has oval leaflets with even margins; honey locusts are oblong and the margins are slightly wavy or notched. Black locust has short, stout spines that are merely attached to the bark, like prickles of rose bushes,

and drop off or are easily broken off. Honey locust has long branching thorns that are part of the wood of the tree and cannot be easily detached except by cutting. The fruit of the black locust is a straight, dull brown pod, 2 to 4 inches long; the pod of honey locusts is 6 to 18 inches long, bright brown or purplish in color and always more or less curved and twisted. The pods of black locust split open easily; those of honey locust must be torn apart. The differences between these trees enable one to readily distinguish them at all times of the year.

Honey locust is native from Ontario to Florida, west to Kansas and Texas. Ordinary trees are 50 to 75 feet high and 18 inches to 2 feet in diameter, but in the rich bottom lands of the Ohio valley honey locusts have been known to grow to a height of 140 feet and a diameter of 6 feet. In the forest, it usually does not have a trunk quite as straight and clean as black locust. In the open it branches low and forms a spreading, rounded top. The lower branches extend at nearly right angles to the trunk, and the twigs droop with considerable grace. The bark of the trunk is very dark colored and may be rather smooth, but on large trees is commonly cleft into very broad, thick ridges. The twigs have a zigzag growth, and are covered with shining brown or greenish-red bark. The older twigs frequently have strong, shining brown thorns, and the trunk is usually equipped with still larger weapons of defense. These thorns are specially developed branches. The fact that most of the thorns are branched near the base to form a cross, has caused the tree to be called the three-thorned acacia and the Acacia of the Passion.

Four of five buds are found at each leaf scar, but only the upper one of these buds can be seen, and that is exceedingly small. The flowers appear late in the spring, in small greenish clusters. They are fragrant and honey laden but not showy, nor are they pea-shaped, like those of the



LOCUST AS A SHADE TREE

Honey locust planted as a street tree in Kansas. The honey locust is free from the serious insect and fungous enemies that beset the black locust, and is in every way an admirable tree for shade and ornamental planting. It is one of the hardiest trees for planting in the naturally treeless area of the United States.

black locust. Each cluster is composed entirely of either pollen-bearing or pod-forming flowers. Sometimes both kinds of clusters are found on the same tree; at other times they are on separate trees. The long twisted pods ripen their seeds early in the autumn, and drop from the trees, a few at a time, throughout the winter. The pods contain a sweet pulp, from which the names honey locust and honey shucks originated. They enclose 10 to 15 flat, oval seeds. These may be sown in the fall or kept in moist sand over winter and treated like black locust seeds.

The heartwood is colored bright reddish brown, and is surrounded by a thin band of light colored sapwood. When quarter-sawed, the wood has a beautiful figure. In other qualities it resembles the wood of black locusts, and is used for similar purposes. The seeds sometimes have a local market at country flour mills, where they are used to cleanse the bolting cloth screens.

Honey locust naturally selects the rich soil of moist river bottoms, but will do well on any soil except where it is exceedingly wet. Its annual rate of growth is 1 to 2 feet in height and one-third to one-half inch in diameter. It is very hardy and free from serious insects and fungous enemies. It is a most useful tree not only for planting for shelter belts and hedges in the prairie regions, but as a shade and ornamental tree in a large portion of the United States. If the thorns are objectionable, the thornless variety can be obtained.

Another species, the water locust (*Gleditsia aquatica*) is a small tree found infrequently from South Carolina to Texas, and northward in the Mississippi Valley to Illinois. A third and very rare species of honey locust is found in Texas.

The writer is indebted to the United States Forestry Service for some of the photographs and material in this article.

TREES

What is the wisdom taught of the trees?
Something of energy, something of ease;
Steadfastness rooted in passionless peace.

Life-giving verdure to upland and glen;
Graces—compelling the praises of men;
Freedom that bends to the eagle and wren.

Largess—expanding in ripeness and size;
Shadow that shelters the foolish and wise;
Patience that bows 'neath all winds of the skies.

Uprightness—standing for truth like a tower;
Dignity—symbol of honor and power;
Beauty that blooms in the ultimate flower!

By STEPHEN HENRY THAYER
In *Pulp and Paper Magazine*

THERE were cut from the National Forests in the fiscal year 1916, 604,920,000 board feet of timber. Of this amount 119,483,000 board feet was cut under free use privilege by 42,055 individuals. In all, 10,840 sales of timber were made, of which 97 per cent were under \$100 in value, indicating the extent to which the homesteader, rancher, miner, small millman, and others in need of a limited quantity of timber draw upon the Forests.

A REMARKABLE WHITE ASH

By Herbert W. Cornell

THE curiously shaped tree shown in the accompanying photograph was discovered by the writer in the summer of 1916 while studying silviculture in the summer camp of the School of Forestry of the Pennsylvania State College, near Lamar, Pennsylvania. It is a



LOOP IN A TREE

This white ash tree was found near Lamar, Pennsylvania, and is such a curiosity that it was cut down and placed in the collection of the School of Forestry at the Pennsylvania State College.

white ash, about forty feet in height, with a remarkable loop about twelve feet above the ground, the bole at this point being about four inches in diameter. The location of the tree makes it improbable that the deformity could have been brought about by human agency. Most probably the tree was bent over and partially broken when young by another tree falling on it, with the result that a small lateral twig became the main trunk. A careful examination showed some evidence that there had been two breaks, but this was uncertain. The tree was in an apparently thriving condition when found. The trunk was secured by Professor J. A. Ferguson of the Pennsylvania State College and has been removed to the college museum.

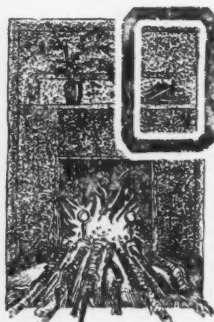
TREES WITH A HISTORY

IS there a tree with a history in your town? What do you know about it? Is it being cared for or is it being allowed to die? **AMERICAN FORESTRY** would like to know about such trees and would be glad to receive pictures and articles not to exceed 100 words about such trees. Such as are available will be printed in the magazine from time to time.

FORESTRY FOR BOYS AND GIRLS

BY BRISTOW ADAMS

"IN THE PLACE WHERE THE TREE FALLETH"



NE meets all sorts of folks who are interested in trees. At one end of the line there is the man who cuts, burns, and wastes the woods with no thought of any one but himself, or of anything but the money he may make, even if he makes it by des-

troying all hope for any future returns from the same piece of woods. At the other end is the man or woman who cannot bear to see a tree cut for any purpose, and thinks that any use of an ax is wicked.

We think that a middle place is better, and that both of the extreme views are wrong. There is this difference, however: the man who cuts and wastes is sinful; the one who cannot stand the wise harvesting of the wood crop is only foolish. Sometimes this foolishness makes us laugh, sometimes it makes us mad, and sometimes it makes us sad. Then, again, it may cause all three of these feelings.

The children frequently ask me to tell about an old man I once knew, who loved the trees, but not wisely. The youngest thinks the story is funny, and the oldest girl finds it sad; those in between seem to think that it is a curious sort of yarn, and don't know just how to take it. I wonder how it will seem to you!

THIS old man used to write to me about the trees, and finally he asked whether I would come and talk about them before some of the schools near where he lived. He said he would arrange for all the meetings, and that all I would have to do would be to bring along some lantern slides and my voice, and they could do the rest.

My own children will not let me leave out any part of the trip or of what hap-

pened; if I try to skip, or if I forget even the smallest thing they "call me down" and make me put it all in—about the boy who met me at the station and drove me out to the man's house in a rickety old rig like the wonderful one-hoss shay, the horse being very small and very thin, and all shaggy with long matted hair, which looked as if it had been whitewashed in spots.

"Mr. Emanon sent me," said the boy, "because he was sick and could not come." (Emanon is just no name, spelled backward, because I would not hurt the feelings of this old man for all the world.)



"But I should not go if he is sick; it will make a great deal of trouble for him."

"That don't make no difference," replied the boy. "He always gets sick-like when he's excited about folks coming."

So I climbed into the old shay that was wired together and reinforced in places with umbrella-ribs, and we set off behind the little horse that had all its feathers rubbed the wrong way. The boy said "they had another horse but it was dangerous to drive"; this one, he said, had only one bad habit—"it would lie down and go to sleep jest anywhere!" But it stayed awake and on its feet until we got to the house—a little dark house in a little dark woods.

THERE was a dim light in one of the lower rooms and the boy told me to go in while he put the horse up. I found myself in a dim-lighted hall; there were stuffed birds, old books, pictures, and dead flowers in vases and dying ones in pots. These things I could see from the flames of an open fire in the next room, where there were four dogs—an old blind mastiff, a young setter, a white bull-terrier, and a shaggy Airedale that growled from beneath the piano but did not offer to come out.

Stretched fan-wise out over the floor, with their ends in the fire, were huge



fagots of wood, some of them quite twenty feet long, and reaching into the far corners of that gloomy and disordered room. There were great limbs of blight-killed chestnut, dead young cedars and pines, punky old butternut, and many other sorts of sticks, some rusty with dry rot, and others chalky with fungus. They stuck out like rays from the hearth and used up most of the floor. I learned later that they were gradually shoved into the fire-place as the inner ends burned away. At times in the past, some of the sticks must have been forgotten until the fire had crept out along them, past the edge of the hearth, and had charred ragged holes in the floor.

THEN, from somewhere in a dark corner, a voice called me by name. It was a clear and sweet voice, but sad. Soon I was face to face with Mr. Emanon. He was old but not feeble, and was interested in trees, as I thought he would be; but strangely, he knew very little about them, either as to their names or uses. He loved them, but he did not know them! This seemed very strange, because with us, the better we know a thing the more we seem to like it. Nor did he seem to get much joy from this love, and there's something wrong in love without gladness.

He proved to be a strange man. His heart was big, so big, I thought, that it outweighed his head. He wanted me to help him get Congress to pass a law that no creature with wings—not even chickens—should ever be put in a cage, with the possible exception of canary birds, and their cages should be eight feet high by ten feet long.

WHEN it came to trees, he said that no tree should ever be cut; if they did not die or shed their limbs he would go without a fire because he could not bear to see destroyed for fuel the living, growing trunks. His own woods had never been touched by the ax since he had known them, and he was going to give them as they were to his native state, with the fixed rule that not a stick of wood was ever to be cut from them. Of course they were all in a tangle, and full of disease and decay, for lack of care

and thinning. He did not seem to realize that there is just as much need for forest sanitation to check disease and insects, as there is for right measures in the home, or in the growing of farm crops or fruit.

The sound of an ax, he said, really made him ill. Only a few days before he had taken to his bed at hearing a horrible chopping in the neighborhood, and was greatly relieved the next day, on looking from his bedroom window, to find that it was only a telephone pole that some linemen were removing.

It was no wonder that he was a sad man, when he looked on all his neighbors as sinners and vandals, and saw in the rest of the world a mass of people bent on destruction alone. I could not make him see the wise use of trees, and I think he was greatly disappointed in me. However, I promised to talk to the schools about how to know the trees, and not about how to use them, and that made him feel a little better.

The next morning, as I was leaving that sombre house, Mr. Emanon was more sorrowful than ever, because the big mastiff had died during the night. He thought the neighbors had poisoned the dog, but it is my belief that the poor beast died of old age, for besides being blind he was very thin and weak.

SO I drove off with the boy again; and I never did convince the sorrowful owner of that lonesome home in the dying woods that the forests were for our service, and that it is our duty to use them wisely for ourselves and for the future.

"This is the wild horse," briefly explained the boy as we rode away.


"Is he so very bad?"

"Sometimes he acts fierce!"

"Does he run away?"

"No; he just kicks up and smashes the carriage all to pieces!"

But the horse was meek enough. I could see no difference between this and the sleepy one, even to the smears of whitewash. It is at this point, the end of the story, that Toto always pipes up and says, "That boy was only fooling you, Dad; both of those horses were the same one!"





Photograph by Fred A. Shuts

PLANTING MEMORIAL OAK AT

BY MRS. LYDIA ADAMS-WILLIAMS, STATE CHAIRMAN OF CONSERVATION

TO perpetuate patriotism, and as a mark of veneration for the Father of his country, the Forestry sub-department of the Conservation department of the District of Columbia Federation of Women's Clubs, recently planted a red oak sapling near the tomb of George Washington at Mount Vernon. The ceremonies were in charge of Mrs. Addie W. Foster, chairman of forestry, who was assisted by Dr. Margaret Huddleson, vice-chairman, to whose efforts the success of many of the preliminary arrangements is due.

Harrison Dodge, superintendent of the Mount Vernon estate, in a congratulatory address, received the tree on behalf of the board of regents. Representatives of the following-named clubs, societies and organizations were present, and each representative threw in a shovelful of

earth: the District of Columbia Federation of Women's Clubs, the Daughters of the American Revolution, Legion of Loyal Women, Women's Relief Corps, Ladies of the Grand Army of the Republic, New England Society, Sons of the American Revolution, League of American Pen-Women, Woman's National Press Association, Order of Rebeccas, P. E. O., National Woman Suffrage Association, American Forestry Association, Grand Army of the Republic, Abacadabra, General Federation of Women's Clubs, Excelsior Literary Clubs, Capitol Hill History Club, Columbia Heights Art Club, Philo-Classics and several others.

"The oak tree is truly representative of Washington," said Mrs. Wm. E. Andrews, past president of the federation; "he was as strong as an oak and was never worried

A PIONEER PINE PLANTER

S. T. KELSEY, thirty-third degree forester and one of the pioneer white pine planters of the country, was at the annual meeting of the American Forestry Association in Washington. He has attended a lot of these meetings and has been talking white pine since 1856 when he brought down thousands of the seedlings from Canada and planted them in Illinois.

Kelsey, whose home is now in Baltimore, went to Kansas in 1865 and there talked of the virtues of white pine but they were having some exciting times in those days in Kansas and Kelsey had a hard time getting people interested in either white pine or forestry. At last, however, the Atchison, Topeka and Santa Fé Railroad decided

that a few trees here and there would make things look more like home to the settlers and the road put Kelsey to work. He, therefore, became the first forester employed by a railroad. He planted trees all along the Santa Fé for four years but as Kelsey says; "the people did not take much interest when corn was eight cents a bushel and they got more out of it by using it for fuel than sending it to market."

Kelsey tried for years to organize a forestry association but could not get more than a score of men interested at any one time. Now however things have changed and Kelsey rarely misses an annual meeting and at every one of them he is warmly congratulated.



MOUNT VERNON ON THE POTOMAC

FOR THE DISTRICT OF COLUMBIA FEDERATION OF WOMEN'S CLUBS

by the winds of adversity and sarcasm that blew about him." The ceremony was declared by Mrs. Mary S. Lockwood, chaplain of the Daughters of the American Revolution, to be a sign that the women of the country still revere the memory of Washington and believe in his ideals. Mrs. Carrie E. Kent, another past president, presented the birdhouse for the tree and accompanied the gift with an original poem, in which she urged all to look upward and extolled the oak as the emblem of beauty, strength and power, and all-embracing love.

Mrs. Charlotte Emerson Main, past president, stated that the District of Columbia Federation of Women's Clubs, under her régime, was the first woman's organization to take up Conservation, the work being started by Mrs. Lydia Adams-Williams. Mrs. Main declared that the

oak was typical of the great strength of Washington, making him a "monarch among men." Others who took part in the program were Mrs. Anson Rogers Tracy, who presented the tree; Mrs. Augustus Knight, director to the General Federation, who prophesied that the oak would become great and beautiful with an enduring influence for patriotism and loyalty; Mrs. Jason Waterman, who read an extract from Henry Ward Beecher; Dr. Margaret Huddleson and Dr. Ella Marble Tanberg, each of whom made addresses. Mrs. Harry Cunningham led in singing patriotic music; an original poem by Mrs. Jessie L. Engle was read by Mrs. Main; and the exercises were closed by Mrs. Court F. Wood, president of the federation, who delivered an address on the tree as a memorial to Washington.

CHARADES FOR CHILDREN

Here Are Some More Puzzlers for the Children. Who Can Answer Them? Those Who Cannot May Read the Answers in March American Forestry

NUMBER 3

My first is the name some give to a dog
While my second you'll find at home 'neath
a log
Put these two together and then you will find
A fruit that makes jell of the very best kind.

Answer next month.

NUMBER 4

My first is a name Lincoln gave to his son
My second boys jump with after a run
Put these two together and lo and behold!
You'll find him in pools where it's dark and
cold.

Answers to last month: 1—Walnut 2—Sparrow.

THE WAXWINGS FAMILY

(Family Bombycillidae)

By A. A. ALLEN, Ph.D.

THE family of waxwings is one of the smallest families of birds, containing but three species. In spite of this, however, the family has a wide distribution throughout the northern hemisphere, one species, the Bohemian waxwing, being found in North America, Europe, and Asia.

Waxwings are easily distinguished from other birds by their sleek, almost silky brownish plumage and their crested heads. They get the name of waxwing from the

sects. With the ripening of the June berry and the choke cherry, however, the waxwing varies its diet with a considerable quantity of fruit, so that often about the sweet cherry trees, particularly where native fruit or mulberries are scarce—together with the robin, the oriole, and the woodpecker—he becomes a veritable pest. He continues his diet of fruit through the winter until insects appear again in the spring, wandering from the wild grapes to the mountain ash, Boston ivy, and Virginia creeper berries, and finally descending to the barberries in the spring when all other fruit is consumed. They travel in compact flocks until the nesting period, flying with a direct, even flight that can be recognized at a distance. Sometimes these flocks number hundreds of individuals but usually less than a dozen. It is interesting to watch them feeding, for they have gained for themselves the reputation of being the only birds or wild animals in which the rudiments



THE NEST AND EGGS OF THE CEDAR WAXWING

This home is in a sweet gum tree. The waxwing waits until midsummer before beginning to nest and lays grayish blue eggs that are doubly spotted.

appearance of the inner feathers of the wing which seem to be tipped with little drops of red sealing wax. Across the tip of the tail in the Bohemian and Cedar waxwings is a band of yellow, but in the Japanese waxwing of eastern Asia the band is rosy red.

The Bohemian waxwing in this country is confined in summer to the Northwest from Alaska to British Columbia, wandering erratically southward to the northern United States in winter, occasionally appearing as far east as New York and New England. It is a much larger and grayer species than the common Cedar waxwing, having white bars in its wings and with the under tail coverts reddish instead of white.

The Cedar waxwing, which is a fairly common bird throughout the United States and Canada, is better known in most places by the name of cherry bird because of its fondness for fruit. Until the fruit ripens in the late summer the waxwings feed largely upon canker-worms, elm-leaf beetles, and other pests of orchard and shade trees, becoming expert fly catchers in the pursuit of flying in-



PATIENCE REWARDED

The cedar waxwing is called the "cherry bird" because of its fondness for fruit. It more than repays for the damage which it does about sweet cherry trees by the large number of insects which it destroys.

of etiquette are developed. It is not an uncommon sight to see a small flock arrange themselves on a branch where only the one at the end can reach the fruit. He plucks it and very politely passes it to his neighbor and thus on down the line until the last bird is reached and he swallows it. This may continue for some time before they scatter and commence feeding by themselves. The origin or meaning of this habit has not yet been ascertained but it certainly seems quite in keeping with their quiet, reserved ways, their dignified bearing and polished appearance.

For some other unknown reason their nesting season is greatly delayed and although they are with us throughout the year, they wait until all other birds except the goldfinches have reared their broods before commencing to build. Some nests are started as late as September but the majority are begun about the middle of July and some as early as the middle of June. The nest is a rather bulky structure placed in a fruit or shade tree or often in a thorn bush from five to twenty feet from the ground, and the



THE CEDAR BIRD RETURNS WITH A FULL MARKET BASKET
Instead of carrying the food in its beak like most birds, the waxwing fills its crop and later regurgitates it. Here the bird's throat is seen distended by the cherries which it has brought back to its young.

bluish gray eggs are doubly spotted, some of the spots seeming to be put on beneath the surface of the shell.

Waxwings are faithful parents, one bird usually standing on guard on some conspicuous tree top near the nest while the other incubates or broods the young.

The food is brought to the young in the crops of the parent birds, their necks often appearing quite distorted when a half dozen or more cherries are brought back at once. The accompanying picture of the bird at the nest shows the bird's neck thus distended. In the other photograph of the single young, the old bird has just thrown back its head and coughed up a cherry which it is about to present to its hungry offspring.

The best protection against the depredations of the waxwings and other fruit-loving birds is the planting of plenty of native fruit about the orchard to supply the food which they need, and an occasional frightening. Strips of paper or bright bits of glass or tin hung in the trees are sometimes efficacious, although it is usually necessary to frighten the birds occasionally by banging a tin pan or firing a blank cartridge. It is a shortsighted policy to shoot them for they more than repay the farmer for the cherries by the insects which they destroy at other times of the year.

A ONE-TREE PUBLIC PARK

By Allen H. Wright

BECAUSE a noble oak tree had stood for many years on a highway leading out of the city of Visalia, California, the authorities, when it came time recently to improve this thoroughfare as a city street, decided to permit the tree to remain where it was, in all its glory.

To do this in a legal manner an ordinance was adopted setting aside a plat of ground about the base of



THE COUNTRY'S SMALLEST PARK

This is located in Visalia, California, and was created in order to preserve a noble oak tree on a highway leading out of the city.

the tree, ten feet square, and dedicating it as Askin Park, in honor of the mayor of the city, and the wife of the latter was made the official custodian of the park, situated at the intersection of Main Street and Giddings Avenue.

Now the city of Visalia, in addition to its many other interesting features, claims to have the smallest park, dedicated for public use, in the United States, if not in the world. It can lay claim, in all probability, to having the only one-tree park in the country, also. Visitors to Visalia often take the drive out Main Street in order to be able to say they have viewed this diminutive park.

AN immense pecan tree on the farm of W. A. Tonini, a few miles east of Evansville, Indiana, was felled recently. The tree was six feet in diameter and, according to the rings, was 400 years old. The tree was visited by the officers of the National Nut Growers' Association and was declared the largest pecan tree in the United States.

HOW FAR TO GO IN CAVITY FILLING

By J. J. LEVISON, M. F., FORESTER FOR THE CITY OF NEW YORK

READERS of AMERICAN FORESTRY often ask us about cavity filling—just how it should be done, and, what is more important, when to do it and when not to do it. We shall now have a heart to heart talk on this question and see if we cannot come to a mutual understanding on its limitations and advantages.

Generally speaking, there are two classes of cavities: those which are shallow and afford no chance for the accumulation of moisture and those which are deep and afford opportunity for the accumulation of moisture.

The treatment of the *shallow* group of cavities is a very simple one. All soft and decayed wood should be chiseled off so that the water falling on the surface of the wound will naturally run off. The exposed wound should then be thoroughly covered with a coat of coal-tar mixed with creosote; nothing else should be done to it for a year or two, when another coat of tar and creosote may be applied.

In case of *deep* cavities where moisture lodges, the treatment is different. With these we must not only eliminate all decayed and diseased wood but we must also fill the cavity or part of it so as to drain water. The absolute elimination of diseased wood and the prevention of any possible accumulation of moisture are the two main considerations in all cavity filling. This involves considerable experience and knowledge of fundamental principles and for this reason if one has not had enough experience himself it may often be preferable to call upon some one of the tree expert companies. Before filling the cavity, the operator should determine whether it is worth doing the work at all or whether it is more practicable to cut the whole tree or branch off. A cavity may be so permeated with disease or so deep or the tree so old and weak that the entire elimination of disease is impossible; also the condition may be such

that the tree or limb may break soon after the filling is put in. In that case it is wiser to sacrifice the tree and not to fill the cavity.

Where, however, a filling can be put in with advantage, the process should consist in removing all diseased wood from it with the free use of the knife, chisel or gouge. It is far better to enlarge the cavity by cutting out every bit of diseased wood than it is to leave a smaller hole in an unhealthy state. Disease left within the cavity will continue its destructive work behind the filling with more vigor than if there had been no filling at all. Where there are boring insects within the cavity, their destruction must be assured before filling is commenced.

When the cavity is absolutely freed from disease and insects, its walls should be washed with corrosive sublimate and covered with white lead or with Bordeaux mixture. The interior should be studded with nails and solidly filled with bricks, stones, and cement or with charcoal, bricks, and

cement. When that is done, the outer edge of the cavity is interlaced with wire to assist in holding the solid material in place, and a layer of cement, mixed with one-third sand, is then placed over the wire. When dry, this layer should be covered with coal-tar. The exposed face of the filling must not be brought out to the same plane with the outer bark of the tree, but should rather recede a little beyond the growing tissue which is situated immediately below the outer bark. By this method the growing tissue will be enabled to extend over the cement and cover the whole cavity, if it be a small one, or else to grow out sufficiently to overlap the filling and hold it as a frame holds a picture. The growth of this living tissue can be much accelerated by cutting around the border of the orifice immediately before the season of growth commences. Of the many failures in filling cavities, the great majority are due to



FILLING A TREE CAVITY

It is essential that every bit of decayed and diseased wood shall be cut or scraped out and also that the cavity is filled so as to drain water, for when this work is improperly done it is wasteful and often injurious.

an incomplete removal of diseased wood, to the cement being flushed out to the surface of the outer bark, or to the want of tar on the outer surface of the filling.

Cavity filling to a limited extent, when properly done, is very useful and conducive of much good. When improperly done or done unnecessarily, it is wasteful and often injurious. Here are a few instances of the unnecessary and improper kind often met with:

One often sees diseased cavities covered with sheets of tin. This allows all decayed wood and fungous growth to remain undisturbed within. Now, no one would think of filling a cavity in a tooth without first removing all decayed matter from the interior of the cavity and then washing it with some antiseptic solution. Still, here were similar operations tolerated on trees with utter disregard for these fundamental principles. The tin coverings did more harm than good, because they merely shut out the sun and wind and added more dampness to the interior, thereby favoring every possible development of disease.

Another instance which came under my observation was an attempt to replace bruised bark with cement. This was repeated on hundreds of trees at a vast cost and with utter failure. The person responsible for this work did not understand the purpose of filling a cavity, for, had he known that the filling should be put there to prevent moisture from lodging within the cavity or to furnish a support for the growing tissue to roll over, he might easily have seen that in this instance there was no chance for moisture to lodge on the perpendicular smooth surface, and that the exposed wood furnished ample support for the growing tissue to roll upon. The application of a little coal-tar to the exposed wood would have been all that was necessary. The cement covering, however, merely favored decay, and when the growing tissue on each side of the wound began to extend, it pushed out the cement.

On still another occasion the owner was investing a large sum in filling cavities in chestnut trees that were at the time badly afflicted with the chestnut disease. The



THE COMPLETED FILLING

Here the tree cavity is properly filled. The interior, cleansed of all foreign substances, is studded with nails and solidly filled with bricks, stones and cement, the outer edge is interlaced with wire to assist in holding the material in place and the outer layer of cement is covered with coal-tar.

operator should have recognized the presence of the disease; he should have known that there is no remedy for it, and that the speedy death of these trees was inevitable. As it happened, the trees soon began to die, and the impracticability of the treatment became evident.

ADVICE FOR FEBRUARY

1. Continue removing and burning trees previously marked during the fall.
2. Clean up the heavy brush in the woodlands and burn the superfluous parts while the snow is on the ground.
3. Work on wounds and cavities, confining yourself to digging out all decayed wood, chiseling out old stubs so as to drain water and covering all exposed wounds with coal-tar in mixture with creosote.
4. Collect and burn cocoons and egg masses of insects.
5. Commence pruning fruit trees. Remove dead and superfluous branches from apple trees and cut the crowns back so as to form low compact heads.
6. Inspect all pear trees for fire blight and cut out all

cankers from main branches and trunks and tar the wounds. Also cut out black knot from plum and cherry.

7. Spray fruit trees for sucking insects and canker. Determine beforehand what you are spraying for by communicating with your local agricultural experiment station or by submitting samples and details to this Department of AMERICAN FORESTRY. Then use chemicals and methods especially prescribed for the particular pest you are spraying for. Choose a mild day for spraying work.

8. Prune and tie up grape vines by the end of this month.

9. Turn over the manure pile or leaf mold compost prepared last fall and see that the liquid manure is not wasted.

QUESTIONS AND ANSWERS

Q. I wish to rig up a wagon for moving large deciduous trees from a caliper of eight to fourteen inches.

Can you give me any advice or suggestions concerning the

most successful outfits used in your section, or the names of any parties who manufacture for sale outfits for this work?

H. F. B., Minneapolis, Minnesota.

A. With reference to moving your trees, I beg to say that the best outfits for this purpose may be had from Messrs. Isaac Hicks & Sons, Westbury, Long Island, New York, or from Messrs. Lewis & Valentine, Roslyn, Long Island, New York. Both of these firms operate in the Middle West, or send their apparatus there, and I would suggest your writing them direct.

Q. I am desirous of obtaining about 3000 trees (black or yellow locust) to be used as a wind break for several plots of white pine. Where can they be bought? How long before they mature to fence post size and will they grow in New York State climate and in a dry sandy loam. The New York State Conservation Commission does not handle them.

L. B. G., Gray, New York.

A. I am very much interested in your inquiry, and note that you desire about 3000 black or yellow locust to plant as a windbreak to protect white pines. I would not like to recommend this tree for your purpose in your location, as I am afraid it would kill back. The soil condition would be all right, but I am afraid the climate would be too severe. The best thing you could use would be more white pine, or red pine, which would cost you just about as much. We are not, however, recommending the planting of white pine anywhere at present, except under the most rigid inspection, and then never in states where there are areas infected by the white pine blister rust, and this is true of New York. Perhaps you have read or heard something of this, which is a dread disease attacking the white and five-leaved pines of the country and seriously threatens their extinction. My best advice to you would be to write Mr. C. R. Pettis, Superintendent of State Forests, at Albany, put your proposition right up to him, and be guided by his advice. He will tell you what is best to plant under the circumstances and where you can secure it, and you will be perfectly safe in following his suggestions. Let us know if we can help you any further.

Q. There stands in my front lawn a balsam which was planted by me about fifteen years ago, and has, until the last year, been a vigorous, thrifty tree. Last summer I noticed that the needles or leaves of the tree were turning red on the upper half of the tree and that very little new growth appeared, and at present, through the action of the wind, these dead leaves are dropping off. I know of no cause for this unless it be the fact that for quite a time during last winter it was laden with sleet and snow. No abrasions or other injury are apparent anywhere. Can you tell me where the trouble comes from and how to remedy it if I am not already too late? I prize the tree quite highly and would fully appreciate any information which will enable me to re-establish its former healthy condition.

C. F. C., Hillsboro, Wisconsin.

A. Replying to your inquiry, it would be hard to tell from just a description what is the trouble with your balsam. I would advise that you spread two or three inches of well-rotted manure around the base of the tree at the present time, and dig the same into the ground in the early spring. Have the manure extend outward as far as the branches of the tree. The tree has probably suffered for water and food. If possible, it may also help to cut off the top of the tree to the extent of a few feet. This will make the tree grow more bushy and compact and decrease the requirement for moisture. A good book for you to have would be Levison's *Studies of Trees*. This sell for \$1.75. The chapter on "Diseases and Requirements of Trees" would be helpful to you.

Q. I transplanted several red oak trees from the woods this fall, some of them about 20 feet high and with long side branches. Will you kindly give me some information in regard to the best way to prune them and at the same time stating whether this should be done now.

I have a young black walnut tree on which the tip end of the main top branch has been split. Is there anything I can do

to enable this main branch to continue growing or shall I be obliged to cut it off, which I suppose would prevent it from growing again. R. M. S., Cincinnati, Ohio.

A. I would suggest pruning your transplanted oaks *hard*. Cut in every branch several feet and do it any time. Oak trees can best be moved in spring. Oak trees moved from the forest should have their long tap roots shortened, but it is too late for that now.

As to your young black walnut, try putting grafting wax in split part and tie the affected part with burlap. It may heal next spring. Should you be obliged to cut it off eventually you can bend another twig over and tie it to a stick in order to train it to form a new leader. It will later on become strong and erect enough to form a new leader.

Q. Where can I procure a caliper rule for measuring trees? If you know where one can be purchased I would appreciate your kindness if you would furnish me the name and address.

S. J. C., Mount Vernon, New York.

A. A caliper rule can be procured from Keuffel & Esser Company, 127 Fulton St., New York City. Telephone, 80 Beekman.

Q. Can you inform me whether there is any Suffolk County or Long Island Forestry organization in existence, or whether any organization is interesting itself in the forest fire question in this locality, or whether this subject is in your jurisdiction.

E. C. H., East Hampton, New York.

A. Replying to your recent inquiry, I beg to say that in Suffolk County, Long Island, Mr. Townsend Cox, Jr., of Setauket, Long Island, has formed a local Forestry association, interesting itself in local tree protection. Also, Mr. Charles M. Higgins, of 271 Ninth Street, Brooklyn, has done about as much as anyone in preventing forest fires on Long Island, and has published a little booklet. The Nassau County Association, with headquarters at Mineola, L. I., is beginning to interest itself in forest fires. I am sending you a special report on State Forest Organization, with special reference to fire protection, which will, I am sure, be of value to you. Mr. J. J. Levison, of Sea Cliff, Long Island, New York, incorporated miles of fire lanes and other systems of forest-fire prevention all over Nassau County on Long Island. There are no other bodies specially interested.

Q. I have a swamp of about an acre, the surface of which is about 12 inches above the water of the nearby lake when the water is at its highest level. The ground is rather soggy, and the soil is very rich. Are there any conifers which will grow under these conditions? I would like to make the place resemble a natural tamarack swamp as nearly as possible, and eventually to grow in it Moccasin flowers, Pitcher-plants, Swamp lilies, etc. To do this I must get shade, and I should like to get a variety of conifer to grow, if possible. Any advice which you may be able to give in reference to varieties, methods of planting, etc., will be very welcome."

A. S. B., Minneapolis, Minnesota.

A. You could best use the tamarack and the black or swamp spruce, under the conditions you describe. The latter may not make more than a very small tree, and the tamarack will probably outstrip it, but the combination of colors will be an advantage even though they do not compare in height. Farther north, of course, the black spruce makes a larger tree than the tamarack, and it may be that under your particular conditions they will attain about equal size. There will be no special care required in the planting of these trees, other than that ordinarily exercised in the transplanting of coniferous evergreens. I am sending you under separate cover a bulletin of the Department of Agriculture on tree planting on rural school grounds, which will be helpful to you.

EFFORTS TO SAVE THE BIRDS

BY DR. R. W. SHUFELDT, FELLOW OF THE AMERICAN ORNITHOLOGISTS' UNION

IN the hope of securing an appropriation to provide money for enforcing the provisions of the excellent Migratory Treaty Act with Canada, for which conservationists labored so long, a bill is now before Congress awaiting action. It provides for \$170,000 to be placed at the disposal of the Department of Agriculture, in order that the treaty may be enforced and the migratory birds protected according to its provisions.

The necessity for such protection is readily apparent. In the last forty or fifty years several species of birds have become extinct because they were ruthlessly slaughtered. School children know of the Great Auk and how it was completely wiped out by man on its breeding grounds, being used by countless thousands for fat and fishing bait. Hundreds of our water birds are without protection, doomed to the same fate, to say not a word with respect to a similar number of land birds. I have always held that we are entirely responsible for the disappearance and extermination of the bird-life of this country, and that the same destruction has been, and is now going on in other parts of the world, along precisely the same lines. In very rare instances it ap-

pears to be difficult to trace the extermination of some bird to man's having been the cause of it; this applies especially to the case of the Labrador or Pied Duck. This beautiful bird disappeared utterly toward the latter part of the last century; there were none left in 1880, and none had been

observed for a number of years prior to that date. In 1868 I saw four or five of them on Long Island Sound, and, to the best of my recollection, these were two males and three females. A good skin of a male will now fetch a thousand dollars or more. A number of years ago I saw a fine male, then owned by John Lewis Childs, of Floral Park, Long Island; it was in his private museum, and, if my memory serves me rightly, he took a trip across the Atlantic to purchase it in London, securing

the specimen for \$1000. Subsequently he disposed of it at such a price that he lost nothing by going to Europe to obtain it.

No cause for the disappearance of this handsome duck has apparently been discovered. It was a marine species that never went inland; indeed it was called, among other things, the Shoal Duck, as it had the habit of frequenting the shoals and banks at low water to feed. It was an unsuspecting and

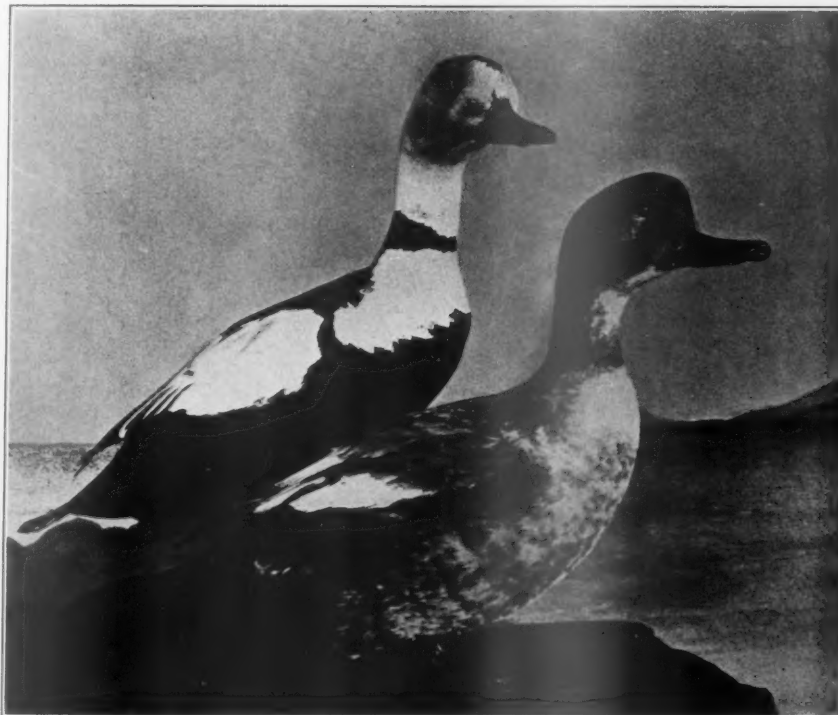
RESOLUTION

Adopted at the International Forestry Conference of the American Forestry Association at Washington, D. C.,
January 18-19, 1917

Resolved

That the American Forestry Association respectfully urges the present Congress to make effective, through the necessary legislative action, the recently ratified Convention between the United States and Great Britain for the protection of the useful migratory birds.

Speedy action is desirable in view of the increasing economic loss to all the people, which must ensue if action be deferred until the next Congress.



THE EXTINCT LABRADOR OR PIED DUCK

There are three mounted specimens of this now extinct Duck in the National Museum, two of which are shown in this illustration. The male is the black and white one and is a Long Island specimen presented to the American Museum of Natural History by the late D. G. Elliot, and the Museum later presented it to the United States National Museum. The female in the picture originally belonged in the collection of Professor Spencer F. Baird, who got it from Audubon, who, in turn, received it from Daniel Webster. It is a Martha's Vineyard specimen, and was used by Audubon in making his plate of this species.

conspicuous bird, easily seen at a long distance, and was shot in numbers for the markets, and I shall always believe that its extermination was largely due to its being persistently hunted by man.

There are very few examples of this duck in our museums—not more than five in the National Museum, with six or seven in the American Museum of Natural History; none of its eggs are in existence. Only a few of the eggs of the Great Auk have been preserved, and one of these sold, some years ago, in London at an auction, for \$1200.

Within very recent time, a large species of one of our curlews has been exterminated by our gunners, as shown by the late Mr. W. W. Cooke. Many other species of our birds are being rapidly killed off in the same merciless manner, and among these are the several very beautiful quails or partridges of the Pacific coast.

Perhaps the best known of all these instances, however, is the extermination of our Passenger or Wild Pigeon. In the days of Audubon, flocks of these birds numbered a *great many millions*; they were often miles wide, several hundred feet deep, and flew at a high rate of speed for days at a time. A big forest fire in Arkansas once destroyed thousands upon thousands of them—the trees forming their roosts being burned. High winds blew thousands of them into the Atlantic



THE LAST PASSENGER OR WILD PIGEON

This picture of this beautiful bird, which is now entirely extinct, is a reproduction of a photograph, made by the author, of the mounted specimen of the last wild pigeon (*Ectopistes migratorius*) that existed upon this planet. The specimen is on exhibition in the United States National Museum, to which institution it belongs. It is here given about two-thirds natural size, and this photograph of it appears for the first time.

taxidermist of the National Museum, and placed on a special perch, in one of the cases in an exhibition hall.

THAT wrapping twines which give thorough satisfaction can be made from paper has been demonstrated by experiments made by the Forest Products Laboratory at Madison, Wisconsin. Several hundred packages, each containing a medium-sized book, were wrapped and fastened with the lightest-weight paper twine and were mailed to various points throughout the United States. Reports show that practically every package was received in good order and that in no case was there any damage which could be charged as a fault of the twine.

Ocean during their migrations, into the Gulf of Mexico, or the Great Lakes. But millions upon millions of them were slaughtered by many at their regular roosting-places, and at such times untold thousands of them were allowed to rot on the ground. Often herds of hogs were turned in upon the dead and dying birds to devour them. Quite suddenly the species ceased to exist—it entirely disappeared.

At New Canaan, Connecticut, in 1872, I witnessed the tremendous flight of these big, blue pigeons; I shot only comparatively few of them, while hundreds of gunners were shooting them for the mere sport of seeing them fall. My old teacher of taxidermy, Mr. James Jenkins, remembered the countless millions of these pigeons in the flights in New York. He described their alighting by thousands upon thousands on the upper part of Manhattan Island, and on houses in Newark, Harlem, and in the outskirts of New York City and Brooklyn. A number of these birds were kept a few years ago at the Zoological Gardens, of Cincinnati, Ohio; and the very last Passenger Pigeon in the world, a female—"Martha"—died there early in September, 1915. That specimen was skinned by Mr. William Palmer, of the U.S. National Museum, mounted by Mr. Nelson R. Wood,

THERE were cut from the National Forests in the fiscal year 1916, 604,920,000 board feet of timber.

Of this amount 119,483,000 board feet was cut under free use privilege by 42,055 individuals. In all, 10,840 sales of timber were made, of which 97 per cent were under \$100 in value, indicating the extent to which the homesteader, rancher, miner, small millman, and others in need of a limited quantity of timber draw upon the Forests.

THE FOREST SERVICE REVEALS LUMBER INDUSTRY CONDITIONS

THAT unstable and partly speculative forest ownership in the West and South is the cause of frequent over-cutting of the market and waste of forest resources is announced by the Forest Service in a report just off the government press. Too large stocks of timber acquired from the public domain and too much timber speculation mixed with the manufacture of lumber, says the Service, underlie the present instability of the industry.

All this, the Service points out, concerns the lumber user. Many states are paying dearly for lumber because their own timber is largely used up and outside supplies can be obtained only at high costs for transportation. With little being done to grow new forests on cutover lands, a more widespread shortage of forest products is threatened in the future.

The Forest Service advocates various forms of open-price coöperation among lumber manufacturers to make the industry more efficient and check wasteful over-production. But it is strongly against changes in the present competitive character of the business through combinations to control output or regulate prices, even though advocated in the name of conservation.

The report contains the boiled-down conclusions of a study of timber ownership and the lumber business, undertaken by the Forest Service to find out how this business as conducted to-day affects forest conservation and the interests of the millions of users of wood in the United States, and to see whether the public policies for conserving the nation's forest wealth go far enough. It is also sought to help the industry solve the serious problems which confront it. Added weight is given to the report by the concurrence in its publication of the Federal Trade Commission, which coöperated with the Forest Service in the Investigation. The Commission, however, reserves its specific conclusions or remedies for a report of its own to be published later.

THE Forest Service finds that the main problem of the lumber industry has grown out of the hundreds of billions of feet of timber acquired cheaply a few years ago from the public domain. Lumbermen in the West are carrying vast quantities of timberland beyond all possible needs of their present sawmills and logging camps. Widespread speculation during a few years of sudden development carried timber values very high, and many western stumpage holdings have been over-capitalized.

The business of making lumber, says the report, has thus been loaded down with investments in timberland. The productive branch of the industry has been interlocked too largely with speculations in its raw material; and instead of standing on its own feet as a manufacturing business, has tended to be the tail of the dog, made frequently to serve the exigencies of timber speculation. According to the report, pressure from an overload of

timber is the first cause of the general instability of the industry. For one thing, it has led to building mills beyond the demand for their products. At least a third of the saws are now idle.

On the other hand, the Forest Service reports that social and economic changes in the United States are reducing its proportionate use of lumber. Uses taken over by other structural materials within the last ten years are estimated at one-fifth of the present yearly cut of lumber; and in the same period the per capita consumption of lumber seems to have passed its peak and dropped nearly one-fourth.

CAUGHT with its burden of timberland on the one hand and these changes in the country's use of wood on the other, the lumber industry, the report points out, has been between an upper and nether millstone. The combined result is an ill-adjustment of lumber production to market requirements, with frequent, almost chronic overproduction. Ups and downs have been the rule with most manufacturers in the West and South. Occasional years of high earnings have been followed by usually longer periods of small profits or loss. The latter reached their climax in 1914 and 1915, although 1916 brought somewhat better conditions.

In the regions studied by the Forest Service, it found that lumber production, with local exceptions, is competitive, as a rule keenly so. Competition becomes still more vigorous in its struggle between different regions in selling lumber in the main consuming markets of the country.

Lumber retailing was studied in all of the Middle Western States only. In that region the Service found it to be competitive for the most part, although its competition is less rigorous than in the case of lumber manufacturers. The restraints upon trade in lumber distribution, however, in the Central States studied, are judged to be local rather than general; and developments in recent years have tended to increase competition.

THE rising cost of lumber to consumers, which held generally up to 1907, is attributed by the Forest Service primarily to the exhaustion of the supplies of timber nearest to the bulk of eastern consumers, and the necessity of transporting lumber from greater and greater distances. Railroad freights now take a fifth or more of the consumers' price, retailers about the same amount, and manufacturers, on the average, little more than one-half. The high cost of lumber is thus due in large part to local timber shortage, resulting from the rapid using up of forests without provision for their renewal. Other causes, according to the Service, lie in the greater demands for specialized service made upon the retailer by the purchasing public, in higher labor costs, and in the decreasing purchasing power of money. Since

1907, however, the effects of overproduction have been felt, and the prices of common structural woods have made no sustained increase.

The American public, the Forest Service points out, has no responsibility to protect the security of timber investments or the outcome of speculative ventures. The welfare of many sections, however, depends in no small degree upon lumbering as a large tax payer, a gigantic employer of labor and capital, and the chief consumer of agriculture and other industries. The people of the whole country, furthermore, have a live interest in the economical use of present timber supplies and in continued forest production after logging.

THE report lays special emphasis upon the fact that such waste in the use of our natural forest wealth as is now taking place will tell inevitably in the future cost of lumber, paper, and other products manufactured from timber, as it has told already in many "cut out" states. Furthermore, under present conditions, little is being done to restock the forest lands logged for their virgin timber. The total use of wood in the United States exceeds by a good deal the aggregate growth of its forests; and unless the enormous areas of cutover land, to which millions of acres are added every year, are put to growing new forests, the Forest Service thinks that the danger of a nation-wide shortage of timber and high prices for all wood products will become acute. The unstable condition of the lumber industry, the report says, makes it unable to do much toward renewal of the forests which it has destroyed.

The experts in the Forest Service believe that a more stable kind of forest ownership, divorced from manufacture to a larger degree than now, must come about before the ills of the lumber business can be cured permanently. This kind of ownership must not only carry the present stocks of merchantable timber until the productive industry needs them, but also provide for regrowth on cutover lands. The extension of public forest ownership, both state and national, should, in the judgment of the Service, have a large part in this accomplishment.

According to the Service experts, there is no surplus of forest resources above the country's needs. There is rather a lack of forests, particularly of growing forests to take the place of the reservoirs of virgin timber now being drained. The difficulty lies, says the Service, in the wrong kind of forest ownership.

ANATIONAL mistake, the report goes on to say, was made in such rapid and wholesale passing of title to timberlands in the public domain, beyond all immediate needs for local or industrial development. Private ownership, hard pressed to carry these staggering quantities of timber during the long periods which must necessarily elapse before they can be converted into lumber, is now sacrificing them in part by wasteful use because of its own financial exigencies. The carrying of this future resource, the Forest Service declares, should have been a public rather than a private function. The report urges

that this situation be faced frankly and the obvious remedy applied, that of taking part of the western timberlands back.

Much can be accomplished also, the report says, by public and private coöperation in fire protection and in securing methods of taxation better adapted to timberlands; and, to insure the regrowth of logged-off forests, reasonable public regulation of the handling of private lands will unquestionably find a place in working out the problem.

FINALLY, the Forest Service disagrees radically with the idea now rooted in many quarters that forest conservation should be sought through permitting industrial combinations for the regulation of lumber production or control of lumber prices. It regards such developments as involving dangers to the public interests through restraint of trade so serious as to offset any possible advantages to the public from such forms of conservation as they might foster. The Service believes, in fact, that such measures as joint control of lumber output by agreement would be ineffective in holding back the pressure to cut timber and in overcoming the other weaknesses which cause overproduction. Betterment in the industry, the Service holds, must come largely through strengthening individual operators or owners, and particularly through a more stable ownership of forest lands, in which the public participates to a much larger degree than now.

The Forest Service advocates such forms of coöperation as trade associations and selling agencies, safeguarded by public supervision and regulation. But changes in the competitive status of the industry, like joint control of production of price, can, in the view of the Service, come about only with an entirely different national conception of the country's basic resources. The adjustment of public and private interests in a national policy which seeks the wisest use of forest resources and controls the industries which exploit them may then become possible, including the principle of regulating output. But in any developments of this nature, the public should have a direct and a ruling voice.

PURCHASE OF FOREST LANDS

THE acreage acquired by the Government under the Weeks forestry law during the fiscal year 1916, was more than double that acquired during the preceding year, and in excess of the total acquired under the Act from the date of its enactment in 1911 to the end of the fiscal year, 1915, according to the annual report of the Solicitor of the United States Department of Agriculture. These purchases were in Georgia, Maine, New Hampshire, North and South Carolina, Tennessee, Virginia and West Virginia.

OAK is the most suitable wood for carving, on account of its durability and toughness, without being too hard. Chestnut, American walnut, mahogany and teak are also desirable, while for fine work Italian walnut, lime, sycamore, apple, pear or plum are generally chosen.

AERIAL FOREST PATROL

By W. T. COX, State Forester of Minnesota

THE time has passed when flying machines should be looked upon as toys or experiments. They have been developed to the point where they are being used daily and with comparative safety. Within the past five years thousands of men have been trained to guide aeroplanes and hydroaeroplanes among the clouds with a greater degree of safety than any other kind of machine or conveyance can be driven at the same speed on the ground.

The European War is calling for aeronauts in increasing numbers. They are wanted to carry dispatches, to observe movements of enemy forces, and even to carry on offensive movements against the enemy. They are not only practicable and reliable as machines go, but are now considered almost indispensable for the armies.

Some years ago, when I watched the Wright brothers make the first successful flight for the Government prize at Fort Meyer, Virginia, it occurred to me that aeroplanes were certain to find a field of usefulness in forest patrol. In what other way could a large tract of forest be so quickly seen and fires detected? Since the winning of that prize at Fort Meyer, the Wright brothers and many others interested in aeronautics have been steadily and rapidly perfecting the different types of flying machines. Today they are almost as practical as the automobile.

To appreciate what the advent of the aeroplane means in patrol work, it is necessary to know what constitutes adequate forest patrol and what it costs. Let us figure a little. Ninety-nine forest fires out of every hundred can be extinguished in a few hours by one or two men if the fire is reached within half a day after it starts. That is why the rangers and their patrolmen are effective. But it costs money to maintain the right kind of a patrol force. There should be at least one man to every 72 square miles of forest, 22 to every million acres, 110 men for five million acres. The maintenance of these men for six months at \$70 per month, plus necessary equipment in the shape of canoes, tents, etc., would amount to \$49,500. This is exclusive of the cost of special fire-fighting crews, and winter work to see that loggers burn their slash. Sixty thousand dollars a year, in round numbers, would be the cost of adequately protecting five million acres of forest; and, since that area of forest land represents about \$100,000,000 worth of inflammable property, the protection cost—six hundredths of 1 per cent—is fairly low insurance. It would be a fortunate city government that could maintain its public fire department at anything like so low a rate. Nevertheless, by the use of flying machines even this low cost of protecting the forest can be reduced, particularly in a country like northeastern Minnesota, where there are so many lakes.

Five million acres represents one-quarter of the forest region needing patrol in Minnesota; it represents also the lake-dotted area of Northeastern Minnesota, which is

peculiarly adapted to patrol by the use of hydroaeroplanes or flying boats. An aeroplane, it may be stated, starts from a fairly smooth spot of ground and must alight upon a similar clear space of ground. A hydroaeroplane, as the name signifies, starts from a water surface and alights upon water. Northeastern Minnesota, with its thousands of lakes and numerous streams, is the place above all others on the continent where flying boats can be used to advantage in forest patrol. Three hydroaeroplanes and four officers are required. The machines, allowing for a life of three years, cost \$7750 a year; repairs and supplies \$100 a month, or \$600; two aviators, at \$200 per month; two observers, at \$100 per month; and a mechanic at \$80 per month, cost \$4080 for the six months annual service. This brings the total expense for six months aerial patrol for five million acres to \$12,430. The aerial patrol cannot entirely replace the foot and canoe patrolmen, because a certain number of men are needed at accessible points to respond quickly to calls when fires occur. The number of such men for five million acres varies from 20 to 30, depending upon the kind of season; an average force of 25 men should suffice. In other words, the use of flying boats for one season at a cost of \$12,430 reduces the patrol force by 85 men, whose wages would have amounted to \$38,310—a net saving in patrol cost of \$25,880.

My idea in advocating the use of hydroaeroplanes in northeastern Minnesota was that the U. S. Navy Department furnish the machines and establish a training station for aeronautics in connection with the Naval Militia Station at Duluth. The State of Minnesota might then co-operate, at slight expense, with the Federal Government in the carrying out of systematic aerial patrol. By such an arrangement, Minnesota would profit in having adequate protection over millions of acres of forest, worth to the State millions of dollars a year for timber production and recreation purposes. The United States Government would profit through protecting the Superior National Forest and through training up a corps of competent aeronauts for the national defense. The proposition was taken up with the Washington authorities more than a year ago. Secretary Daniels seems to be favorably inclined toward the plan, and it is probable that some such arrangement can be worked out in the near future.

AT the direction of the King, Spain has passed a law providing for National Parks. The measure also provides for the better protection of the fauna and the flora, according to an announcement of Consul General Hurst at Barcelona, and for a publicity department to better acquaint the traveling public with the scenery of Spain.

ANNUAL MEETING AND FORESTRY CONFERENCE

THE Thirty-seventh Annual Meeting of the American Forestry Association and the International Forestry Conference held in connection with it at Washington, D. C., January 18-19 proved to be the most largely attended forestry meeting ever held in this country. Not only did members of the Association attend in large numbers, but delegations from many of the states and from several of the provinces in Canada were present.

The sessions were devoted to three main topics: recreational uses of National Forests and Parks and conservation of game on each; reports, addresses and discussions on the white pine blister disease and how to fight it; and addresses and discussions on the advisability of a national quarantine against the importation of tree and plant stock from other continents in the effort to keep out of this country the tree and plant diseases which now do hundreds of millions of dollars, damage each year.

At the annual business meeting of the American Forestry Association the officers were elected as follows: President; Charles Lathrop Pack of New Jersey.

Vice-presidents: Andrew Carnegie, New York; William E. Colby, California; Coleman Dupont, Delaware; Dr. Charles W. Eliot, Massachusetts; Dr. B. E. Fernow, Canada; Henry S. Graves, District of Columbia; Everitt G. Griggs, Washington; Hon. David Houston, Secretary of Agriculture; Hon. Franklin K. Lane, Secretary of the Interior; Hon. Asbury F. Lever, South Carolina; Hon. Thomas Nelson Page, Ambassador to Italy; Gifford Pinchot, Pennsylvania; Mrs. Frances Folsom Preston, New Jersey; Filibert Roth, Michigan; Dr. J. T. Rothrock, Pennsylvania; Mrs. John D. Sherman, Illinois; Hon. Wm. H. Taft, Connecticut; Joseph N. Teal, Oregon; Theodore N. Vail, Vermont; Hon. John Weeks, Massachusetts; Dr. Robert S. Woodward, Washington, D. C.

Treasurer, John E. Jenks, Washington, D. C.

Directors, John S. Ames, Massachusetts; W. B. Greeley, Washington, D. C.; Alfred Gaskill, New Jersey; Chester W. Lyman, New York; and Charles Lathrop Pack, New Jersey.

At the morning session the address was on "Economic Justice for Lumber and Forests" by E. A. Sterling of Chicago, a director of the American Forestry Association.

In the afternoon the addresses were, "National Parks as National Playgrounds," by Robert Sterling Yard of the Department of National Parks; "Recreational Uses of the National Forests," by Henry S. Graves, Chief Forester, U. S. Department of Agriculture; "Conservation of Game in National Forests and National Parks," by E. W. Nelson, Chief of the Bureau of Biological Survey; and a film story, "Attractions of the National Forests," by C. J. Blanchard, Statistician of the U. S. Reclamation Service.

The morning of the second day was devoted to the pine blister disease situation. The disease was discussed by Dr. Perley Spaulding, U. S. Forest Pathologist; and the situation was described in four great divisions as follows: In New England, by W. P. Wharton of Massa-

chusetts; between the Hudson and the Mississippi by E. A. Sterling of Illinois; on the Pacific Coast by E. T. Allen of Oregon; and in Canada by Clyde Leavitt of Canada. S. B. Detwiler, U. S. Forest Pathologist gave his views on what should be done about the disease; C. R. Pettis, Superintendent of the New York State Forests, discussed the advisability of planting white pine; and Dr. Haven Metcalf, chief of the U. S. Office of Forest Pathology, discussed the problem as a whole.

The substance of these papers and the resolutions regarding the situation as passed by the Conference will be found on another page.

At the concluding session in the afternoon C. L. Marlatt, Chairman of the Federal Horticultural Board, spoke on "The Losses Caused by Imported Tree and Plant Pests"; a paper by David T. Fairchild, Agricultural Explorer in Charge of the Office of Foreign Seed and Plant Introduction on "The Independence of American Nurseries" was read by his assistant, Mr. P. H. Dorsett, and J. G. Sanders, Economic Zoölogist of Pennsylvania, spoke on "The Necessity for a Federal Quarantine Against Tree and Plant Importations." These papers will be found in the magazine.

A fitting climax to the two days of hard work, serious addresses and discussions, committee meetings, etc., was the smoker given on the last evening of the meeting to the visiting members and delegates by the American Forestry Association. President Charles Lathrop Pack presided and there were informal addresses, music and lunch.

THE RESOLUTIONS

The resolutions adopted by the Forestry Conference, with the exception of the resolution relating to the pine blister disease, which will be found on another page, were as follows:

THE BOY SCOUTS

RESOLVED, That the American Forestry Association recognizes The Boy Scouts of America as a movement from which great good has already resulted in Planting Trees and in the prevention of and fighting forest fires, and that under proper direction the Boy Scouts may become one of the great factors in the cause of forestry and conservation.

And it recommends to the Board of Directors the appointment of a committee of three to consult with the officials of the Boy Scouts of America to formulate a proper working plan which the Boy Scouts can put in operation in all parts of the United States, said plan to cover all matters in forestry and conservation that a boy should know.

SCHOOL STUDY OF TREES AND FORESTS

Whereas, The child is the heart of society. The secret of permanency lies in its training through the medium of our public school system.

If America is going to conserve her forests, if the dangers from fire, pests and diseases such as the chestnut blight and white pine blister are to be fully appreciated, then it is imperative that our public schools become vitally interested in these subjects.

THEREFORE, BE IT RESOLVED: That the American Forestry Association favors the suggestion that the Departments of Public Instruction of the several states in the Union, encourage in their public schools the study of our native trees and forests, with special emphasis on their growth, proper development and preservation from disease and destruction by fire; and to encourage the planting of shade trees on all school grounds, home grounds and surroundings and along public highways.

LOUISIANA FORESTRY WORK

Whereas, The recent act of the 1916 session of the Legislature of Louisiana, effective January, 1918, which provides that the State Forestry work be in charge of a trained forester, and that the expenditures for Forestry work shall equal twenty per cent of the income derived from the products tax on timber and turpentine, marks a great forward step in that State for forest conservation, therefore be it

RESOLVED, That the American Forestry Association heartily commends and endorses this action of Louisiana, and that a copy of this resolution be sent to the Governor of Louisiana.

PROTECTING MIGRATORY BIRDS

RESOLVED, That the American Forestry Association respectfully urges the present Congress to make effective, through the necessary legislative action, the recently ratified Convention between the United States and Great Britain for the protection of useful migratory birds.

Speedy action is desirable in view of the increasing economic loss to all the people, which must ensue if action be deferred until the next Congress.

STATE FORESTRY WORK

RESOLVED, That the American Forestry Association commends the progress which has been made in independent State forestry work as shown by the existing State Forestry Departments and deplores any effort or tendency to subordinate this work to that of other Departments which might weaken its influence or eliminate technically trained foresters, such changes in organization not being conducive to efficiency or to the best forest interests of any state.

BE IT FURTHER RESOLVED, That a copy of this resolution be sent to the governor of every State.

FOREST AND LUMBER PROBLEMS

UNDERSTANDING that our Federal Departments dealing with forest and lumber problems have under consideration the formation of an Advisory Board to enable permanent

and systematic consultation with forest and lumber interests, we advocate such a board as contributing to the development of a comprehensive American forestry policy.

A NATIONAL QUARANTINE

In view of the spread of diseases and insect pests introduced from foreign countries, such as chestnut blight, gypsy moth and white pine blister.

RESOLVED, That the American Forestry Association favor the principle of absolute national quarantine on plants, trees and nursery stock, to take effect at the earliest date which may be found economically expedient.

TREES IN THE WAR ZONE

THE struggle of the trees for existence in the battle-swept fields of Europe is one of the things that stands out in the memory of Will Irwin, war correspondent, recently returned from Europe.

"I was never quite so impressed," said Irwin, "and there are many things one will never forget after a visit to those battle-fronts, as I was with the trees and their pathetic endeavor to live where man had given up the struggle and there were heaps of dead to testify to his heroism.

"At Verdun I saw the blackened stumps from which the mighty trunks had been shot away. Clustered around their base I would find a little shoot or two bravely sending forth its green to gladden a sorry place. Time and again on trunks that had been left standing blackened and almost stripped of bark, so fierce had been the fire, I found tiny leaves coming forth—for it was April—and those trees still had life enough left to answer to Nature who goes on and on despite the quarrels of humanity.

"It was the same on the Italian front which I visited. There the fighting has been as fierce as anywhere in Europe, although we have not heard so much about it. I found Nature putting forth her foliage in a feeble way among the crags and the rocks and all this despite the terrific gun fire and spreading of death-dealing gases which no human being had been able to withstand.

"The willow is playing a wonderful part in the war. The Italians particularly are using it to weave masks and deceptive fronts for their trenches."

AN ACKNOWLEDGMENT

AMERICAN FORESTRY is very glad to acknowledge the assistance and coöperation of the U. S.

Forest Service in furnishing photographs and necessary data for the preparation of the following articles which have appeared in the magazine from time to time: September, 1915, Longleaf of Pine; October, 1915, Chestnut; November, 1915, Sugar Maple; April, 1916, White or Paper Birch; August, 1916, Mockernut Hickory.

WE TAKE PLEASURE IN ANNOUNCING THAT WE HAVE ON HAND JUST TEN COPIES OF THE REPORT OF THE PROCEEDINGS OF THE SOUTHERN FORESTRY CONGRESS, HELD AT ASHEVILLE, NORTH CAROLINA, FROM JULY 11-16, 1916, AND THESE MAY BE PURCHASED FOR ONE DOLLAR EACH, BY MAKING APPLICATION TO THE OFFICE OF THE AMERICAN FORESTRY ASSOCIATION, WASHINGTON, D. C.

EDITORIAL

THE ECONOMIC NECESSITY FOR PUBLIC FOREST OWNERSHIP

THE most striking fact brought out in the report on "Some Public and Economic Aspects of the Lumber Industry," just published by the Forest Service, is the economic need for publicly owned forests. Nearly every starting point in the consideration of this many-sided question leads to the conclusion that private forest ownership under the conditions existing in a large part of the United States has not made good from the standpoint either of the public or of the timber-using industries; and that a large infusion of public forest ownership is the alternative.

There is little use in crying over spilt milk or in trying to find a scapegoat to which responsibility can be fixed. The situation itself was inevitable. The people of the United States deliberately and in pursuit of more or less clearly defined purposes gave away by far the greater part of the forest resources originally held in common. The method of the giving made speculation in timberlands and their subsequent high capitalization a certainty. The concentration of a large share of the timberlands into enormous individual holdings was also an inevitable feature of the system. That timber speculation should be mixed liberally with the manufacture of lumber followed from the method of disposing of public lands with the absolute sequence of night and day. It was unavoidable that the sawmill should often become the cat's-paw of the timber buyer, to pull some speculative venture out of the fire.

All of these things are parts of a whole. They relate back to the conception of public resources and the uses they should serve which dominated the country during the last half of the last century.

And like nearly all such movements, with their many human and dynamic aspects, the wholesale distribution of the public forest lands accomplished some good. It promoted the settlement of the West, built up its taxable values, stimulated its industrial growth. The things that this method of treating public resources set out to do were actually done in part. But the country must now reckon with the cost. The study made by the Forest Service shows very plainly that private ownership assumed, in the days of feverish development in the Western States, a task beyond its strength; that the "overload" of timber thus created has become the principal source of unstable conditions in the lumber industry and the principal cause of a more or less wasteful use of the country's forests.

The bad results of a more or less temporary and speculative kind of forest ownership are not restricted to the lumber industry; nor are they restricted to the states where the passage of title from public to private hands is still fresh in men's minds. There can be little question from this review of forest conditions throughout the

country that the economic value of the forests of the United States to its people and industries as a whole is in part being destroyed by the wasteful use of these forests which the conditions created by private ownership have forced upon the lumber industry, and by the inability of the industry to replace old forests with new. The report of the Forest Service goes to show that there are upwards of three hundred millions of acres of cutover forest lands in the United States. On the greater proportion of this vast acreage there is little forest production or a production representing but a small part of the growing capacity of the land. It is a safe assumption that the cost of freight on the average thousand feet of lumber used in the United States is increasing from year to year. In the Middle West freight charges have already exceeded 22½ per cent of the cost of lumber to its consumers. This is pointed out as the primary reason why the cost of lumber has gone up. It is one large reason why the per capita consumption of lumber in the country has fallen; in other words, why the people have been forced to practice greater economy in the use of wood. It is becoming more dear because it has to be hauled farther.

In parts of Europe where forest production is maintained only by the practice of very intensive methods, the common forms of building lumber cost no more than in the older portions of the United States. This is primarily because the lumber is grown, manufactured and used at home. Transportation upon it is a negligible factor. The forest history of the United States, on the other hand, is a series of widening circles representing local timber shortages and reflected in rising lumber prices proportionate with the greater distance which the material had to be transported. Where shall we stop? As between shipping ordinary building lumber from Louisiana to Philadelphia or from Puget Sound to Philadelphia and from Siberia to Philadelphia, the question is solely one of degree. The timber famine is not a bogey of the future. It is the necessity for reduced consumption, brought about by higher prices, which are brought about in turn by a shortage of nearby forests.

All of these things we may say have been inevitable. They have resulted from a more or less deliberate course followed by the United States in its economic development. The only new feature is that we are finding it a little harder all the time to reckon with the piper. Are we, supposed to excel as a nation in common sense and in ability to grasp and apply economic facts, to continue to reckon with the piper; or are we going to the bottom of a national economic weakness and build up aright? Can we permit continued wasteful use of the great reservoirs of virgin timber remaining in the West, because private ownership has created certain conditions of

capitalization which have got to be met? Can we afford to let a large part of our potential forest production lie idle?

If the conditions set forth in the report of the Forest Service may be taken as a safe guide, forest ownership is at the bottom of the whole business. A different kind of forest ownership is necessary to give the lumber business stability and to meet the permanent needs of the United States for wood. Other things, like many forms of industrial coöperation, are necessary, but after all are largely palliatives rather than real cures. Permanence in the ownership and management of forest lands is the ultimate remedy. The public forest policy should address itself to that accomplishment. The Government report points out possibilities of a more stable kind of private ownership—and they should receive every legitimate encouragement. But the clear necessity remains for the wide extension of public forest ownership, both state and federal.

A large measure of public forest ownership has been necessary to the development of forestry in most of the countries of Europe and, if the findings of the Forest Service are to be accepted, the United States will prove no exception to the rule. Public agencies, state and federal, now own or control about one-fifth of the forest lands in the United States. A material increase in this proportion would inject more stability into the forest-using industries and give the country better assurance of

a future supply of wood adequate to its needs than any other step which could possibly be taken.

The final answer, of course, must be the practice of forestry on all lands suited to forest production, whether made possible by economic conditions or brought about through public regulation of the handling of private forest lands. The general practice of forestry would not only keep up production somewhere near, at least, the wood-using requirements of the country, but would also by its corresponding limitations upon the amount of material cut from the forests stabilize the industries using them. But this happy solution, while the goal which should never be lost sight of, can not come to pass over night. The process must be one of adjustment, in the investments represented by timberlands and manufacturing plants, in legislation, in more intelligent use of land, in the use of wood in relation to other materials. Definite and clear-cut leadership is needed to point out the way. This must be furnished by the state and nation. Public forest holdings in one form or another should be enlarged to the point which will bring about at least some measure of regrowth in cut-out regions, which will lay the basis for some degree of permanence in the forest-using industries in all regions, and which will give the consumers of the country a reasonable degree of protection in the shifts and changes in the supply of forest products.

SHALL WE SUCCEED IN SAVING OUR WHITE PINE?

THE fight against the imported white pine blister disease, starting as guerilla warfare in 1909, and suddenly developing into a general attack early in 1916, has now reached a critical stage. The enemy, taking advantage of our lack of preparedness, has in this seven year period gained an almost impregnable position in New England, and his advance forces of invasion penetrate to Minnesota and unless quarantining proves efficient, may appear with the coming season in the Rocky Mountains and West Coast States. So insidious is this foe, spreading silently and unobserved by the dissemination of millions of minute spores borne on the wind, that the problem of eradication—as we now realize—calls for the highest type of intelligent leadership. Until this year, it was assumed that the disease could be confined to the plantations made from imported white pines, and no effort was made to scout for its presence in the areas of native pine, until outbreaks were reported of so serious a nature that the Massachusetts Forestry Association became alarmed, and, aided by the Bureau of Plant Industry in the U. S. Department of Agriculture, the American Forestry Association, and the coöperation of certain of the State Foresters, secured funds from Congress and state Legislatures for a general survey to discover its extent and prevalence.

At the close of the season these facts must be accepted as beyond dispute: first, that the disease has gained such a foothold and spreads so rapidly on currants, that it can be checked only by the extermination of either the pines

or the currants bordering on infected areas. Second, that the disease is fatal to all young or small white pines, and is probably equally fatal, though slower in its operation, on mature trees. We quote the field agent of the Bureau of Plant Industry, a man of thorough experience and training, whose judgment should be final.

"In southern Maine, on 5 acres of native pine containing 1000 to 1500 trees per acre from 1 foot high up to 2 feet in diameter, we found nearly 90 per cent infected, and over half the trees already killed or so seriously infected that death is certain. One tree, 15 inches in diameter and 50 feet high, had the trunk girdled 20 feet from the ground, and every main branch of the tree, about 100 in number, diseased. Somewhat similar conditions, on a smaller scale, exist in southern New Hampshire."

Girdling by this disease causes death within the same season. Such facts are conclusive. Southern New Hampshire is the region of most rapid and thrifty growth of white pine, showing that the disease attacks all trees of this species whether sickly or vigorous.

We must either exterminate or quarantine the blister disease, or the white pine is doomed.

To do this we demand united support and will no longer tolerate evasion or misrepresentation on the part of those who have either failed to inform themselves of these facts or who for any other reason wish to keep the public in ignorance of the truth. We quote from a public address recently given by an eastern official:

"In no case, as far as the writer is aware, is there any infection of sufficient magnitude to destroy a stand of white pine of any appreciable size. * * * In most cases the trees (infected) were growing in abnormal conditions and were equally unhealthy from an unfavorable environment and were infested with all the other diseases and insect enemies common to their kind. * * * Plantations of native stock are practically free from the disease * * * More harm than good has been done by the unnecessary agitation in the publicity campaign so systematically carried on at a great expense exciting people over a subject about which enough is not yet known by experts themselves. * * * We have millions of trees in our nurseries ready to go out, and all at once under the guise of public-spirited cooperation, and before there has been sufficient evidence, a campaign is set in motion to discourage and thwart all our laudable reforestation endeavors. * * * It is to be hoped that the average citizen will go ahead planting white pine as enthusiastically as ever."

This same official, after attending the first conference in 1909 in New York to consider the suppression of the blister disease, not only failed to warn the public of the danger, but in a bulletin issued in 1910 included a list of European nurserymen from whom white pines could be imported, heading this list with the name of J. Heins Sohne (Sons), Halstenbeck, Germany, the very firm whose diseased stock had given occasion for calling the confer-

ence. And the state which has suffered the most and has apparently been the center of infection for surrounding states, is the one whose citizens received this guidance and advice, and who are now urged to continue enthusiastically planting white pine, and "to leave the problem of its protection from diseases and insects to be looked after by technically trained officials."

State foresters *who have been technically trained in forestry* have in every instance met the situation courageously and wisely. They realize that until the nation and the states affected have shown the possibility of controlling this disease, that the planting of white pine is attended with extreme risk, and they are willing to sacrifice a few thousand or million white pines in nursery stock rather than run the risk of reproach at a future period for neglect to warn the prospective tree planter. The white pine, while our best, is not our only northern pine. Until this menace is removed, safety can only be secured by mixing red or Norway pine with the white pine in plantations, or discontinuing its planting altogether.

Meanwhile, the efforts of the American Forestry Association will be continued, and it is hoped that all friends of forestry will unite in an endeavor to secure from Congress an adequate appropriation, and from the states the necessary legislation and financial aid in overcoming this disease and preserving to our American civilization the white pine, the noblest tree in all our eastern woodlands.

SHALL WE CHEAPEN OUR NATIONAL PARKS?

THIRTEEN bills are before Congress for the creation of thirteen new National Parks, most of them from areas already under administration as National Forests. Some of these projects, notably that of Mount Whitney in Alaska, are worthy of adoption. But unless Congress is guided in this legislation by something more than the passing whim of some congressman or his constituents, and acts upon clearly defined principles, lasting harm may be done to the cause of National Parks in the west.

Park uses satisfy the needs of but one side of human nature—the demand for recreation. Forest areas supply equally important and vital needs, for shelter, clothing, food, light and power, through the development and use of the timber, grazing and waterpowers.

The older civilized countries cannot afford and do not attempt to exclude these commercial uses from large tracts of productive forest land, in order that the æsthetic sense alone may be gratified. To do this would mean an economic waste which would take visible form in lack of employment, poverty and hunger and the forced emigration of a considerable portion of the local population.

But these communities do not ignore the finer sensibilities of their people, nor overlook the recreational possibilities of their forests. On the contrary, the public woodlands are developed into extensive pleasure grounds by paths and roads. Rest houses are provided for the tourist, and every spot of exceptional beauty or interest is carefully protected and made if possible more attractive.

Our National Forests are devoted primarily to similar economic ends. And what is true in Europe has already

been demonstrated in their management—that recreational uses can be protected and developed on the same areas, by the preservation of strips of timber along water courses, lakes, roads and trails. In this way the highest possible use is made of all portions of the area. Such a policy means stability and permanence.

But what about our National Parks? Will our people, educated by more than a generation of administration for the Yellowstone, the Yosemite, and the Sequoia with its grand trees, abandon the ideal which they have formed of vast spaces untouched by commercial greed, and permit the utilization of the forests, the grazing of the forage by sheep and cattle, and the harnessing of these waterpowers, in these last remnants of our national heritage, the once boundless western wilds? Such a policy is unheard of. As a nation, we intend to hold these parks as they are, and woe betide the influences which may seek to invade them. In the words of Frederick Law Olmsted, one of our foremost landscape architects, "The National Parks are set apart primarily in order to preserve to the people for all time the opportunity of a peculiar kind of enjoyment and recreation not measurable in economic units, and to be obtained only from the remarkable scenery which they contain—scenery of those primeval types which are in most parts of the world rapidly vanishing for all eternity before the increased thoroughness of the economic use of the land."

The ideal here set forth rings true to our national conceptions. It is going to be physically impossible, and wholly undesirable, to attempt to segregate all of our recreational areas as parks. There is not one of our

National Forests but what contains many such areas. *Scenery, and that of a strikingly unusual type, is the distinctive note, for which we expect to pay the price of complete protection from commercialism.* If, by the creation of numerous more or less mediocre National Park areas, we destroy this distinction, and at the same time, throw a sop to local economic needs by breaking down the barriers to grazing, timber cutting and power development, our National Parks will cease to differ in any important respect from the National Forests out of which practically all of them must be created.

With this obliteration of ideals long held and closely cherished, the need for a separate administration of park areas from forest areas will lose its force, and become a drawback and embarrassment instead of an advantage. There would be no valid reason for permitting the Interior Department, by the mere declaration in Congress of the creation of a park out of a National Forest, to take over the administration of the area, if its management permits and requires an exact duplication of all the commercial uses and policies now being supplied by the Department of Agriculture. The common sense of the public will fail to see the advantage of such duplication of administration.

The evils to which we are endeavoring to call the attention of Congress, are embodied in such bills as S. 3486, for the Olympic National Park; S. 3982, to establish a

National Park including Mount Baker; H.R. 16239, for a National Park to be taken from the Angeles National Forest in Southern California. S. 3036, for a Cabinet National Park near Glacier Park, Montana, and certain others, including S. 5913, to greatly enlarge the Sequoia National Park at the expense of the surrounding National Forest areas.

The friends of our parks, and of our National Forests, and the advocates of their continued separate administration, should be vigilant to prevent such hybridization and cheapening of the National Park system, that we may hold fast to a unique national luxury—nay, a necessity—which no others can afford—and which lends to the West its most distinctive charm for the traveler who desires to see the wonders of his own country.

In conclusion, we wish to again call attention to the failure of Congress to pass the bill, H.R. 20447, urged by both Agricultural and Interior Departments, for the creation of a National Park of the Grand Canyon of Arizona, and respectfully suggest that there exists no valid excuse for such neglect. The Grand Canyon needs no defenders. How does it happen that it has no champions in Congress? The public will expect from its representatives a wise, consistent and far-sighted policy in the creation of additional National Parks. Let us begin with the Grand Canyon of Arizona.

DOES STATE FORESTRY NEED "REORGANIZATION?"

WITH the increasing responsibilities of modern conditions, and a higher standard of public service, old forms of state executive machinery are being weighed in the balance, and found wanting. Steadily mounting state expenditures have stirred our legislatures and executives to inquire into the efficiency and economy of the present conduct of public business, not for the purpose of summary retrenchment by the crippling of useful departments, but in order to eliminate actual waste and get the highest possible returns in service for each dollar expended.

Waste in public administration has been so common that many are tempted to cynically accept the condition as inevitable. Such an attitude is unworthy of a strong nation. When we have grasped the principles upon which efficiency is based, we shall apply them without fear or favor. In determining these principles we are not without guidance. The secret of efficiency is the capable executive; the man of trained mind, initiative, resourcefulness and integrity. *Such men must be secured and retained by any business, public or private.* Mediocrity and inefficiency in men who occupy responsible positions is the direct cause of failure, graft, special privilege, and all the familiar evils which have disgraced our public affairs.

But these evils are equally possible in private enterprise and have wrecked many business structures. In private business such losses mean destruction, and the additional pressure for results has secured far greater efficiency. The form of organization which has grown

from these needs has special significance to the seeker after first principles.

Large private corporations which have grown beyond the ability of a single man and, in this, resemble state organizations, invariably rule their affairs through a board of directors. Their functions are clearly defined. They determine the general policy of the institution, select the executive, and hold him responsible for results. The board scrupulously refrains from meddlesome interference with the details of management, while the executive is equally careful not to usurp the prerogatives of the board or assume responsibility for innovations in policy requiring their sanction. Nor do private corporations make the mistake of combining two or more dissimilar lines of work under a single manager, well knowing that the secret of success is a clear-cut concentration on familiar lines. Where two such projects are controlled by the same interests, a separate organization, even to the board of directors, is effected for each, as a fundamental requisite of success.

Public business is still groping in the dark after these facts,—yet for the last decade, state forestry, as well as many state educational institutions have demonstrated conclusively that this same plan is as fully effective in public as in private affairs. Boards without an executive are foredoomed to failure—and there are many such state boards. But in forestry, the insistence on the appointment of trained foresters has, in eighteen out of twenty-seven states, provided this executive. When

appointed by the board, and thus placed upon a basis of merit rather than politics, such executives have not failed in a single instance to faithfully and vigorously perform their duties. Fire protection has become an actual fact, rangers give honest service, forestry education and general knowledge is advanced rapidly, and the confidence of the public is secured.

By contrast, in those states which have either blindly or with deliberate intent combined state forestry with other departments, subordinated the forester to a chief whose head is full of a number of other interests, and removed the stabilizing element of the board, state forestry has either failed to develop or has received a severe setback. Equally poor results have followed when a state, although retaining a separate forestry depart-

ment, resorts to the principle of direct appointment of the forester. From close study of the actual results of state forestry since its first beginnings, these conclusions stand out in a manner absolutely convincing. Only ignorance of the facts or wilful desire to corrupt and make partisan use of forestry departmental machinery and appropriations can form any excuse for reorganizing a State Forest Service established along these lines. Yet strong efforts are being made in more than one state to do this very thing. Let the friends of efficiency and of honest government beware of these specious attempts and hold fast to what is good; or in another decade we shall face the task of reconstructing our forestry departments on the same lines as at present, from the ruins of our attempts to "better" them by fusion and reorganization.

IN THE FRENCH FORESTS

H. D. JEWETT, a graduate of Wyman's School of the Woods, and well known by foresters, who is now a member of the American Ambulance Corps serving in France, writes:

"At our present location I am fortunate in being near some small forests where I have a chance to see some of the French forestry in practice. Some of the Service Forestier men are in the woods here and the Boche prisoners do most of the work. About all the hardwoods are oak and beech but the beech, especially, seems better than what we have at home. There is a beautiful pine (maritime) nursery about eight years old. The spruce plantations here are failures because the soil is the poor limestone variety. The woods are all divided into compartments, etc. such as we studied in "Working Plans." There has been a small mill erected near our camp where they are turning out lumber for war purposes; mostly boards for portable houses and heavy timbers for dugouts, etc. There are many German prisoners working in the mill and they seem to be glad they are not in the trenches. Wood is certainly valuable here as we cannot even pick up the dead wood in the forests, and each camp has a regular wood ration. They have made thinnings in many of the woods for fuel and when the operation is finished the woods look like a park. The leaves are about the only part of the tree not used. The French foresters seem a good lot but I can't talk very fully with them because of my slight knowledge of the language. I hope to see more of the real French forests before coming home."

THAT England and Germany, with their realization of the need for conservation of national resources, are far more particular about the use of creosoted timber for heavy construction work than the United States, and the lesson for the United States in this attitude, is a feature of a forest service bulletin issued by the United States Department of Agriculture in cooperation with the American Wood-Preservers' Association, the bulletin being written by R. K. Helphenstine, Jr., of the federal forest service.

MONEY FOR ROADS AND TRAILS

SECRETARY HOUSTON has announced the amount allotted to each State from the million dollars to be spent during the fiscal year 1918 in constructing roads and trails within or partly within the National Forests. This money is part of the ten million dollars appropriated by the Federal Aid Road Act to assist development of the National Forests, which becomes available at the rate of a million dollars a year for ten years.

The allotments as approved are as follows: Alaska, \$46,354; Arizona, \$58,604; Arkansas, \$9,803; California, \$140,988; Colorado, \$62,575; Idaho, \$108,730; Montana, \$70,042; Nevada, \$19,296; New Mexico, \$42,495; Oregon, \$128,111; South Dakota, \$8,092; Utah, \$41,167; Washington, \$91,944; Wyoming, \$40,684. A total of \$9,995 has been allotted to Florida, Michigan, Minnesota, Nebraska, North Dakota, and Oklahoma. The group of Eastern States—Georgia, Maine, New Hampshire, North and South Carolina, Tennessee, Virginia, and West Virginia—in which the Government is purchasing lands for National Forests, receives \$21,120.

In making allotments, it is explained, ten per cent of the amount available for 1918 is withheld as a contingent fund. One-half of the remainder has been apportioned among the states in amounts based on the area of the National Forest lands in each state, while the other half has been allotted on a basis of the estimated value of the timber and forage resources which the Forest contains.

THE number of fires suppressed on National Forest lands during the calendar year 1915 was 6,324, as against 7,018 in 1914, and an average annual number of 4,759 during the past five years, says Henry S. Graves, Chief of the Forest Service, in his annual report just published. While more than the average number of fires occurred, the timbered area burned over was but 155,416 acres, or 30 per cent less than the average per year for the period 1911-1915 inclusive. The average loss per fire was \$60.41. Forty-four per cent of the fires were confined to areas of less than one-quarter of an acre.

BOOK REVIEWS

The Story of the Forest, by J. Gordon Dorrance, of the Maryland State Board of Forestry. The American Book Co., New York, 232 pages. Price, 65 cents.

The author in a most interesting and instructive way tells the younger generation what the woodlands of the country are and what they mean. The book is particularly of service in the schools. It tells of the forests of America; of the tree and how it lives and dies; of how to know trees; of work in the woods; of the by-products of the forests and of the most famous trees in American history.

Tree Wounds and Diseases, by A. D. Webster. J. B. Lippincott Company, Philadelphia, 215 pages, \$2.50 net.

Here is a book which will fill a public need. Everybody loves trees, many own them. When a tree is sick, diseased or injured the owner rarely knows what to do for it. This book clearly and simply tells what to do and how to do it. The illustrations add considerably to the practical instruction given. The advice will be of service to every tree lover and tree owner.

Southern Forestry Congress Proceedings, Price, \$1.00.

In this is a compilation of the addresses presented at the Southern Forestry Congress, at Asheville, North Carolina, last July. The book contains nearly 200 pages, is neatly printed and attractively bound and should be on the shelf of every Southern lumberman, forester and landowner.

The Well-Considered Garden, by Mrs. Frances King. Charles Scribner's Sons, New York, 290 pages.

This attractive book, profusely illustrated, is by an author whose practical knowledge, keen insight, and splendid enthusiasm combine to make her so well fitted to instruct, advise and inspire lovers of plants and gardens that it will be found by all of these of unusual practical value.

The Book of Forestry, by Frederick Franklin Moon. D. Appleton & Company, New York, 315 pages.

The author, who is professor of forest engineering at the New York State College of Forestry at Syracuse, states in his preface that "The American people are by inheritance a nation of forest butchers" and he therefore aims in the book to awaken a love of the forest in the heart of young America, and a realization that forestry is necessary for the comfort, health and prosperity of future generations.

Hand-book for Rangers and Woodsmen, by Jay L. B. Taylor. John Wiley & Sons, Inc., New York City, 420 pages, \$2.50 net.

The author is a forest ranger in the United States Forest Service and, realizing the need of such a volume as this to serve as a guide for inexperienced men in woods work, he wrote it. It is so complete in

detailed description and in illustration that it is most valuable. While the book is primarily intended to describe the problems confronting the forest ranger, it is also of use to others whose work or recreation takes

them into rough and unsettled regions. The book covers in considerable detail problems dealing with equipment, construction work, general field work, live stock and miscellaneous conditions.

CANADIAN DEPARTMENT

ELLWOOD WILSON, SECRETARY, CANADIAN SOCIETY
OF FOREST ENGINEERS

Suggestions are being made to farmers who have some rough land on their farms, to plant balsam for Christmas trees. They do not take long to grow and should prove a profitable crop.

Practically all of the paper and pulp mills in Canada are preparing to increase their output and many new mills will be built.

The Pulp and Paper Magazine of Canada comes out in a new cover and will hereafter appear as a weekly. This paper is keeping step with the growth of the industry whose organ it is, and is a very creditable one.

The fourth annual meeting of The Canadian Pulp and Paper Association took place January 31st, and was addressed by Sir George Foster, Minister of Trade and Commerce. At the banquet in the evening Sir Robert Laird Borden, Prime Minister of the Dominion, responded to the toast of "Our Country." The Technical Section met on the 30th and 31st. Mr. Herman Guettler read a paper on the "American Barking Drum" and Dr. Bjarne Johnson, one on the "Chemistry of Wood," and there was a general discussion on "The Handling of Wood in Pulp Mills."

In February Mr. Henry Sorgius, Manager of the St. Maurice Forest Protective Association, will be sent on a tour of the Province, by the Department of Lands and Forests, to try to get the limit holders who are not already members of the Coöperative Associations to form new ones in their respective districts.

On February first and second, in the rooms of the Montreal Board of Trade, was held the first general conference on Forest Fire Protection in Eastern Canada. It was under the joint auspices of the Lower Ottawa and St. Maurice Forest Protective Associations and consisted of short papers, by men prominent in different phases of protective work, followed by informal general discussion. Mr. T. B. Wyman, of the Northern Forest Protective Association, Mr. Clyde Leavitt of the Dominion Conservation Commission and other prominent men took part. The subject of the white pine blister rust was discussed. A very important question was also brought up, i.e., the protection of forest areas which

are at present of no commercial value, such as young growth, burnt over territory, second growth, and timber without commercial value, owing to its inaccessibility.

The work of the New Brunswick forest survey is proceeding satisfactorily and at low cost. About 375,000 acres have already been covered. Maps have been made showing the holdings of the Government, boundary lines, drainage, etc., the kinds and amounts of timber and the kinds of soil. The cost has been, including the office work, only 4¼ cents per acre, which is very creditable. This survey will set a Provincial record for thorough and comprehensive work and will put the Province of New Brunswick in a splendid position to lay out future plans for the management of its forests, the regulation of its cut, protection work, etc., and will give all the data necessary for the proper classification of lands so that only those which are really agricultural shall be opened for settlement.

The soil map shows the character of the soil by broad physical types, such as clays, clay-loams, sand-loams, sand soils and swamp soils. The presence of surface and sub-surface stones are also shown, with areas too steep and rugged for cultivation. The timber maps show the main topographic features, and the timber by broad types, with the estimate based on types. This gives the board feet per acre, and the percentage of the different species entering into the estimate.

In the United States, neither the public generally nor the foresters, seem to be aware of the rapid progress which forestry is making in Canada. Almost all of the Provinces now have active and efficient Forestry Services as has the Dominion Government. Fire protection has made rapid progress and public sentiment has reached a point where forest fires will soon be a thing of the past. Public opinion will hold those responsible for poor protection strictly responsible. Proper exploitation is becoming more and more the rule, especially with the pulp and paper companies. A beginning has also been made along silvicultural lines and people at large are beginning to realize that trees must be grown as crops. A large amount of experimental work is being carried on and the outlook for proper utilization and conservation of our forest resources is decidedly bright.



THE GIGANTIC ROOSEVELT DAM WHICH HAS BROUGHT WATER TO THOUSANDS OF DESERT ACRES

THE LURE OF APACHE LAND

By RUSSELL T. EDWARDS

"'Neath that inverted bowl we call the sky," as Omar sang at the wall of a Persian garden, there is no finer work of the Master Artist in all the world than the colored glories of Apache Land—a land full of the mystery of the Redman's lore that has come down through the ages to a country that then was old when the Spaniard Coronado passed that way. The cry of the fierce Apache long has been stilled. Instead, the purr of the motor attunes softly with the colorings that were born of a god-like wrath when Morning Green (the Creator) cursed the land with desert wastes and swore nothing there should bloom again. He left the wonder-colorings to taunt the savage who had rebelled and to be forever a sign that the gods were superior to men.

And so it seems

The Moving Finger writes; and, having writ,
Moves on; nor all thy Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all thy tears wash out a Word of it.

But old Omar, despite his wine-visions prophecies, dreamed not the power of man, for there on the Apache Trail today that handiwork of man, the Roosevelt Dam, makes the god-cursed desert bloom and stands second only in the wonder spots of the handiwork of Nature herself, as if mocking the grim pinnacles the gods had left as a warning. This stage for an age-old pageant is always set. True, the actors of another time have gone, but the crags and cliffs that once

echoed Geronimo's call to battle and to tortures such as the witches never fashioned still are there along the Apache Trail.

This trail to wonderland leads out of Globe, Arizona. You leave the Pullmans of the Southern Pacific Railroad, the smoking obelisks, the copper smelters, and step into luxurious motors that are waiting to take you to this new mirage-veiled country where your picture dreams will all come true. For seventeen miles you see an ever-changing panorama from your soft cushioned seat. The wonderful Arizona sky is above you, while all about are crags, rocks and mighty drops of nature's cliff-made curtains which

seem to forever conceal the mystery of an ancient play.

To the northeast the Apache Mountains round the vast amphitheatre in which once the gods did sit in judgment on the passing show. You are climbing the great divide which separates the Tonto and the Salt River Basins, climbing until a mile above the sea, and then suddenly the reason all bursts in upon you, for far across the purple and golden coloring of an Arizona sun you get your first view of Roosevelt Lake, that pearl-like sea penned in by man and mountain.

There what a lesson in forestry—that lake quenching a thirst that for centuries has cursed the land. Beyond are rainbow-colored hills that have been penciled with crimson, gold and azure by a merciless sun that seemed, day by day through all the centuries, to have laughed piteously at what the gods destroyed. In the descent are seen the cragged homes of the Cliff Dwellers whose civilization had tottered before Cleopatra lured Antony to his doom. That the Cliff Dwellers lived a community life seems certain from an examination of their dwellings. Did they solve this—the question that now puzzles the wisest sociologists in this civilization? Does civilization, like history, repeat itself? Perhaps the delver into antiquity, in these ruins that antedate the Roman Empire, can find the answer to the world-old question that Omar sought to answer.



ONE OF THE LAST MEMBERS OF A VANISHING RACE

The traveler seeks the thing tinged with age. Here then he has it—for on the walls of these dwellings are writings, showing that the inhabitants were highly civilized. Traces of canals for irrigation were to be found showing how the people had fought the battle of life against the odds nature had laid down for the game. These were obliterated when modern man took up the fight in the desert and built the reservoir system now famous around the world.

The drop down the descent of the winding trail brings the thrill akin to days when the old swing started on its downward swoop after you had swung to the height of its reach. You remember the breath catching that came. You get it here from your seat as you lean back and the auto sweeps around prehistoric cliffs over this canyon spanning road, cliff-walled on one side since time eternal and man-walled on the other, that you might see nature's handiwork in comfort. The motor stops and you look and wonder how the Little Men of ancient times managed to get to those homes amid the crags when it has taken the engineering genius of the twentieth century to take you to their base surrounded by the rocking-chair comforts of your home.

As against the prehistoric cliff dwellings, the Roosevelt Dam stands out in bold relief as a link between the centuries now gone and a civilization now dead. This big retaining wall is 1,125 feet long and 380 feet high. It holds back a lake 25 square miles in area. This pile is no less wonderful than the cliff dwellings the traveler has just passed and well may one



THE MASSIVE TIME-SCARRED WALLS OF DEVIL'S CANYON

stand in awe as he sees pictured before him the achievements of the two ages and the two civilizations.

There is pause at the Dam for lunch. Refreshed, one again motors toward the land of Sunset over the second half of the trail that leads to Phoenix and the Southern Pacific's train for Los Angeles and the rose country. One vista after another greets the eye. The well-made road now runs along the side of the sky-scarred cliffs. Through Fish Creek Canyon the motor way is carved on the very face of a cliff.

Up, up, up, there is nothing but rock, while in looking down one sees nothing but the marvelously grotesque

and twisted rocky masses. Next we see old "Arrowhead," sentinel-like, hammered from the solid rock—so runs the Redman's tale—by Chief One-Eye whose ill-shaped form, turned to stone by the wrath of the gods, glares at you farther up the trail. Passing Old Woman's Shoe, Eagle Rock, Whirlpool Rock and the Little Alps we cross Black Canyon and come to Superstition Mountain.

In awe of this the Apache lived; and, as sunset glows about it, the traveler is quite ready to believe the legend of how Chief White Feather and his people were wiped out. White Feather escaped the deluge by scaling this mountain when the waters covered the earth. In prayer, with face upturned to the lightning, the chief held out the precious medicine stone he had carried with him. A bolt struck the stone and White Feather and his followers became pinnacles of rock.

With this age-old legend still fresh in your mind the motor glides into the tree-fringed streets of Phoenix. You step out of legend time and Indian lore into civilization. The comfortable Pullmans of the Sunset Limited are waiting. This trip, a side one, which can be made with convenience only over the Southern Pacific Lines, costs but \$15 in addition to the through fare, and can be made either way—from Phoenix or Globe, depending upon which way you chance to be going. By doing this you have dipped into another world where in ages gone another people sprang up in another civilization, then went their way out where the west begins.



THE HOMES OF A PREHISTORIC RACE

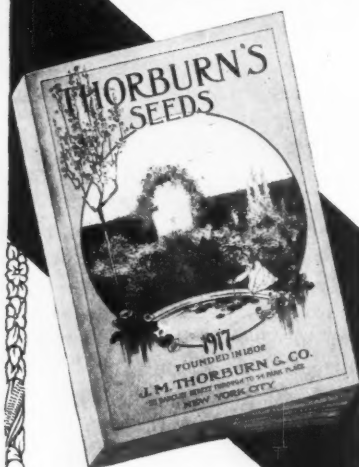


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At the annual meeting of the Canadian Forestry Association in Ottawa on the 15th inst. the following subjects were discussed: "The Peril of the White Pine Blister Rust," speakers, Dr. H. T. Gussow, Dominion Botanist; G. C. Piché, Chief Forester of Quebec; E. J. Zavitz, Chief Forester of Ontario. "Slash Disposal in Commercial Logging Operations as a Fire Preventive Measure," Mr. T. J. Welsh, of Bemidji, Minnesota; R. D. Prettie, Superintendent of Forestry, Canadian Pacific Railway, and Mr. G. A. Gutches, Dominion Forestry Branch, Supervisor for Saskatchewan. "Cutting Regulations on Quebec Crown Lands and their Value in Forest Maintenance," Avila Bedard, F. E. Department of Lands and Forests, Quebec.

"The pine blister disease has not assumed anything like the alarming proportions in Canada that it has in the New England States," stated Clyde Leavitt, Chief Forester, Commission of Conservation of Canada, at The American Forestry Association meeting, Washington, D. C., in January. "The seriousness of the menace is, however," said Mr. Leavitt, "pretty generally recognized, and it is believed that the measures taken and contemplated should enable the authorities to prevent material damage to the extensive white pine forests of the country, which are valued at upwards of \$200,000,000, to say nothing of the potential value of the large areas of young white pine growth in all the provinces of eastern Canada.

"The great bulk of our forest lands are owned and administered by the respective governments. The provinces of Ontario, Quebec and New Brunswick derive a direct revenue, into the Provincial treasuries, of about \$4,000,000 per year, from cutting privileges on these Crown lands. Of this, some \$1,250,000 may be credited to white pine. Thus, it is easy to understand why the governmental agencies should take a very strong and direct interest in preventing the spread of the pine blister disease.

"This disease was first noted in the Fall of 1914, in the Niagara peninsula of southern Ontario. The presumption is that it was brought in on white pine nursery stock imported from Europe between 1906 and 1909. During the two succeeding seasons a number of inspectors have been employed under the direction of E. J. Zavitz, Provincial Forester, in locating infections and eradicating diseased plants, both pines and currants.

"The section where the worst infections have been found is about ten to fifteen miles west of Niagara Falls. Here there is a district comprising some 300 square miles in which there are large numbers of currants and gooseberries. The black currants show more infection than the red. The Niagara peninsula is an old-settled section, with practically no white pine of commercial value, but with many scattered trees of this species in fence corners, lawns,

woodlots, etc. The great problem is to prevent the spread of the disease to the commercial white pine region in the more northerly portions of the province. Some outlying infections have been found to the north and west of the Niagara peninsula, but the measures taken to eradicate diseased plants have resulted in keeping such outbreaks under control.

"Under the direction of the Dominion Botanist, Mr. W. A. McCubbin has conducted research work, which promises important results in the development of control measures for this disease.

"In the Province of Quebec, small infections have more recently been found at two points not far from Montreal. The most serious aspect of the situation in this province is the threatened invasion along the International boundary, from northern New Hampshire, Vermont and New York. It is possible that such an invasion may already have taken place, since the U. S. Bureau of Plant Industry last summer discovered an infection in northern Vermont, within a mile and a half of the Quebec boundary. The Provincial Forester, Mr. G. C. Piché, is now planning the organization of a force of inspectors, who will, during 1917, investigate the whole situation fully, with a view to locating existing infections and taking necessary steps for the eradication of the disease.

"It is fully recognized that such action is of the utmost urgency, since the serious spread of the disease in Quebec would threaten the large native pine area up the whole Ottawa valley in both Quebec and Ontario.

"The white pine areas of New Brunswick do not appear to be threatened as yet, but they may become so, unless adequate action is taken to prevent the spread of the infections located last year in the state of Maine.

"The Ontario and Quebec governments both maintain forest nurseries. The movement of white pine stock from both these nurseries has been discontinued, and the planting of white pine is practically at a standstill until it can be determined what will be the outcome of the campaign for the eradication of the pine blister disease. There are no commercial nurseries selling white pine material, so this feature of the situation is under complete control.

"Under Dominion legislation, the further importation of white pines from outside Canada is prohibited. Dominion laws also provide adequate authority for the destruction of diseased plants, whether pines, currants or gooseberries. The Ontario Act is effective along the same lines. Action in Quebec can be taken under the Dominion legislation, pending amendments to the provincial legislation, should such action be found necessary.

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pine, which must be protected against the spread of the blister disease.

"On the whole, the situation in Canada may fairly be said to be well in hand. The Governments of both Ontario and Quebec have given the most definite assurances that all necessary funds will be provided for this work, and the continued co-operation of the Dominion authorities is assured."

Using Cut-over Lands

The lumbermen of a dozen states are to aid in the development of the agricultural resources of the south, through the utilizing of the cut-over lands left after the manufacture of the forests of the south into lumber. How to accomplish this end will be an important part of a conference of representatives of all the southern states from Virginia to Texas, which has been set for March 19 to 22 in New Orleans.

Long Life for Wood

Interesting booklets on "Long Life for Wood" have just been issued by The Barrett Company which has branches all over the world. The booklets deal with farm timber and their preservation and the articles are illustrated from pictures from the U. S. Department of Agriculture and the Associated Mutual Fire Insurance companies. The booklets call attention to

Bulletin No. 387 of the Department of Agriculture for treatment of timber and detailed instructions.

Strengthening Boxes

Tests at the Forest Products Laboratory, at Madison, Wisconsin, indicate that by the use of four additional nails in each end an increase of 300 per cent in the strength of canned-food boxes is secured.

A Forestry Number

The Journal of Agriculture, published by the students of the University of California, devotes the entire November number to forestry and the edition would be a credit to any large publication or publishing house. The articles are contributed by some of the best known men in forestry work and the pictures are well printed.

Pine Blister in Canada

In the January number of the Pulp and Paper Magazine a great deal of space is devoted to the white pine blister disease. In addition to an editorial there is an article by H. T. Gussow, Dominion Botanist of Ottawa, which describes the pest and tells of the importance of checking its spread.

Forestry Club Meeting

At Seattle, March 1, 2 and 3, will be held the annual convention of the Intercollegiate Association of Forestry Clubs. It is

expected that representatives of all the forest schools of the United States will be present. Many side trips to big mills are planned. The officers for the year are Donald H. Clark, president; Timon Torkelson, secretary; Jesmond Balmer, vice-president.

The State College of Washington will inaugurate this year a short course in farm forestry as part of the winter short course of the department of forestry, this new idea in forestry education being the plan of F. G. Miller, in charge of the department. Washington, since starting its work in teaching forestry problems, has been forging ahead rapidly.

Maple Sugar Industry

In coöperation with one of the leading manufacturing companies, The New York State College of Forestry will undertake during the coming spring the study of the maple sugar industry in New York. An experimental orchard will be tapped near the State Ranger School at Wanakena, New York, and among other things to be investigated are the nature of sap flow, character of individual trees giving best yields, cost and efficiency of various types of equipment, and costs of various operations. The results of these studies will be incorporated in a bulletin.

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There were 133,442 more cattle and horses, and 605,338 more sheep and goats using the National Forests in 1916 than in 1915. This increase was in spite of large eliminations of grazing lands from the Forests. It is accounted for by improved methods of handling the stock and by more intimate knowledge of the forage on the ranges and their carrying capacity.

Decrease in Forest Fires

The number of fires suppressed on National Forest lands during the calendar year 1915 was 6,324, as against 7,018 in 1914, and an average annual number of 4,759 during the past five years, says Henry S. Graves, Chief of the Forest Service, in his annual report just published. While more than the average number of fires occurred the timbered area burned over was but 155,416 acres, or 30 per cent less than the average per year for the period 1911-1915 inclusive. The average loss per fire was \$60.41. Forty-four per cent of the fires were confined to areas of less than one-quarter of an acre.

Forest Fire Losses

It is estimated that in 1915 about 40,000 forest fires occurred in the United States, which burned over about 5,900,000 acres and caused a damage of approximately \$7,000,000.

Our Standing Timber

Revised estimates place the amount of standing merchantable timber in the United States at approximately 2,767 billion board feet. Of this amount 1,464 billion board feet, or 53 per cent of the total, is in California, Washington, Oregon, Idaho, and Montana.

Forest Improvements

During the past fiscal year there were constructed on the National Forests 227 miles of new roads, 1,975 miles of trails, 2,124 miles of telephone line, 89 miles of fire lines, 81 lookout structures, 40 bridges, 222 miles of fence, 545 dwellings, barns and other structures, 17 corrals and 202 water improvements.

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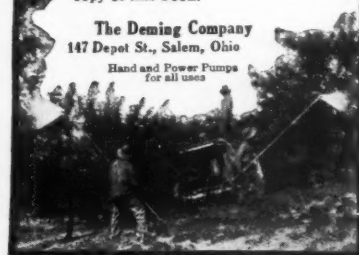
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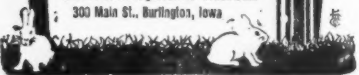
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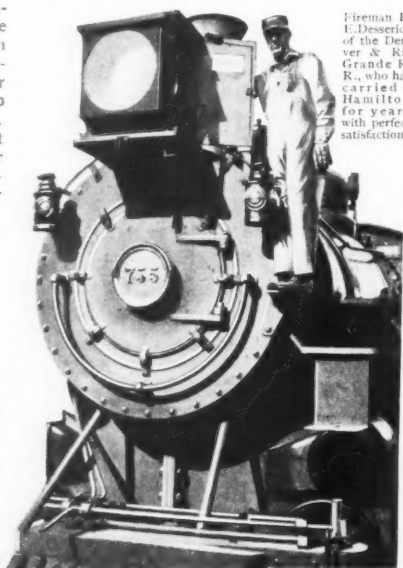
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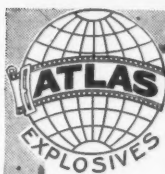
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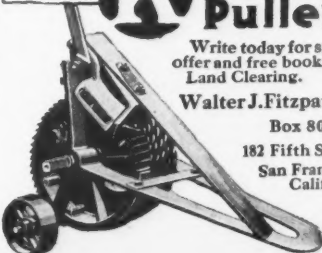
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Each member of American Forestry Association can help in obtaining certain logical advertising. Just remember that you own American Forestry—it is your magazine. Without your earnest cooperation the advertising department cannot accomplish a great deal. Any suggestions will be appreciated.

Ontario adopts a forward policy, p. 853-5; The heliograph in forest fire detection, p. 856-7; Canada's white pine in danger of extermination, p. 858-9; How long will our timber last? by Ellwood Wilson, p. 861-4; Finding fires with aeroplanes, by W. E. Boeing, p. 870-2; A Forest service that booms business; how British Columbia's organization seeks new markets, by M. A. Grainger, p. 873-5; The partnership of farm and forest, by Robson Black, p. 876-8; Forest influences on stream pollution, by N. R. Buller, p. 878-9; The farm woodlot, by B. P. Kirkland, p. 881; Effect of forests on stream flow, p. 886-7.

Conservation, Jan., 1917—Drain on our pulpwood supply, by Clyde Leavitt, p. 3; White pine blister rust, p. 4; Care of the wood lot; its proper handling would provide a permanent fuel supply for the farm, p. 4.

Forest leaves, Dec., 1916—Forest protection in Pennsylvania, by Robert G. Conklin, p. 177-81; The farm wood-lot by J. A. Ferguson, p. 181-3; American trees in Germany, by J. S. Illick, p. 184-5; Problems of the Pennsylvania Department of forestry and the use of data to be derived therefrom, by George S. Perry, p. 185-7.

Journal of the New York state forestry association, Oct., 1916—Recreational possibilities of public forests, by Benton MacKaye, p. 29-31; Shall we commercialize our parks, by Ottomar H. Van Norden, p. 15-18; Can the State of New York afford an idle playground? by George N. Ostrander, p. 19-22, 31-2; Co-operation in forest administration, by Herbert S. Carpenter, p. 26-8.

Northwoods and wild life, Jan., 1917—Must check white pine blister rust, by E. G. Cheney, p. 3-5; Defending the forests; what its forests are worth to Minnesota, by W. T. Cox, p. 7, 12.

Yale forest school news, Jan. 1, 1917—Forest experiment stations, by Barrington Moore, p. 3-4.

Conservation Congress Meeting

At the recent meeting of the Executive Committee of the National Conservation Congress in Washington, it was decided that the next session of the Congress should be held in New Orleans the first week in April. The subject will be "Floods and Drainage."

Aiding Wood Users

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ATTENTION FORESTERS

AMERICAN FORESTRY will print, free of charge in this column, advertisements of foresters wanting positions, or of persons having employment to offer foresters

WANTED—Work during the summer by a young man starting to study forestry. Would accept place of any kind where practical experience could be obtained. Free June 15. Best of references. Address W. W. J. care of AMERICAN FORESTRY, Washington, D. C.

POSITION—Young man (33), single, seven and a half years' technical training. Will consider position as City Forester, Park Superintendent, Superintendent of Private Estate or Consulting Landscape Architect for railroad. Education consists of post-graduate work in prominent middle-western school of forestry, supplemented by several years' post-graduate work in recognized school of landscape design in the East. Experienced in public and private forestry, including work in the Forest Service, the various phases of municipal forestry such as extension work, and tree surgery; and also the designing of parks, playgrounds, and private estates. References given and required. Address XYZ, care of AMERICAN FORESTRY.

PRACTICAL FOREST ENGINEER desires position. Six years' experience. Timber estimates. Reports and Cruises. Logging and Topographic Maps. Logging Railroads, Lumbering, Steam and Horse skidding. Address Box 40, care of AMERICAN FORESTRY, Washington, D. C. (2-4)

WORK for summer wanted by a young man about to study forestry, who wants practical experience in the woods. Be able to begin work last of June. High School graduate. References if needed. Address Box 39, care of AMERICAN FORESTRY. (2-4)

PRACTICAL WOODSMAN AND FOREST ENGINEER with thorough experience this country and Europe will take charge of forested estate or game preserve. An expert in managing and improving woodlands, and can show results. Highest references as to character, training and ability. Address Woods Superintendent, care AMERICAN FORESTRY MAGAZINE, Washington, D. C.

YOUNG MAN (28), single, technical education, five years' general engineering experience, as instrument man and computer, on surveys, and as inspector and superintendent on construction. Also field and office experience with U. S. Forest Service. Capable of taking charge of party; desires position with forester or lumber firm. Address Box 32, care of AMERICAN FORESTRY, Washington, D. C.

MARRIED MAN, (28), desires position as manager of estate, woodland preferred, but no objection to more or less farming. Graduate of agricultural college and Master of Forestry. Best references as to ability and character. Address Box 41, care of AMERICAN FORESTRY. (2-4)

WANTED—Work during the spring and summer by a young man starting to study forestry. Best of references. Box 37, care of AMERICAN FORESTRY. (1-3)

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BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.* :: :: ::

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THE TRAINING OF A FORESTER—Gifford Pinchot.....	1.35
LUMBER AND ITS USES—R. S. Kellogg.....	1.15
THE CARE OF TREES IN LAWN, STREET AND PARK—B. E. Fernow.....	2.17
NORTH AMERICAN TREES—N. L. Britton.....	7.30
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THE FARM WOODLOT—E. G. Cheyney and J. P. Wentling.....	1.70
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IDENTIFICATION OF THE ECONOMIC WOODS OF THE UNITED STATES—Samuel J. Record.....	1.25
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